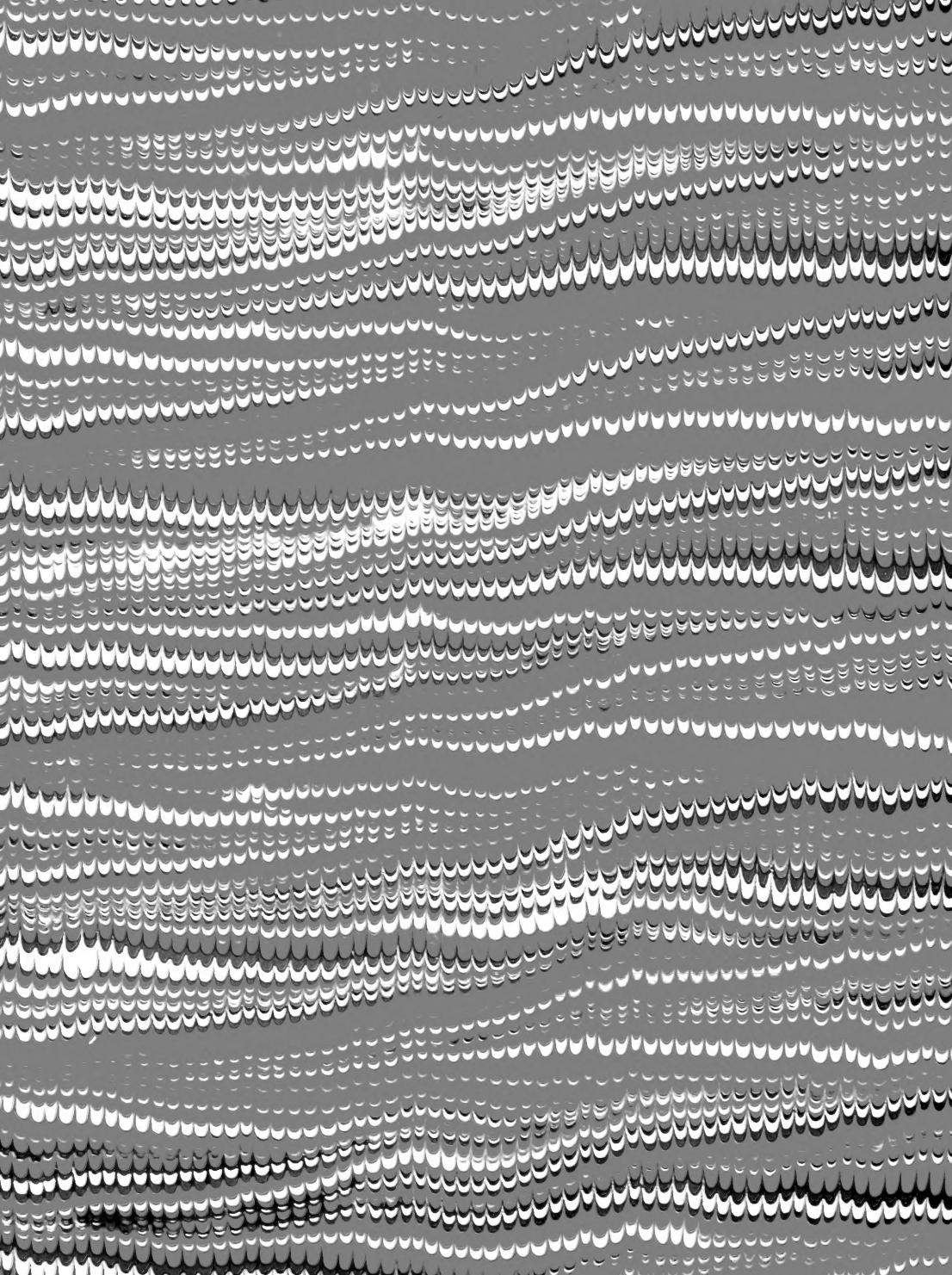

NOVA ACTA REGIAE SOCIETATIS SCIENTIARUM UPSALIENSIS

SER. IV. VOL. 5. N:o 6.

THE CRINOIDS

FROM

DR. S. BOCK'S EXPEDITION TO JAPAN 1914

BY

TORSTEN GISLÉN

WITH 2 PLATES AND 162 TEXTFIGURES

(Presented to the Royal Society of Science of Upsala November 4th 1921)

UPPSALA
EDV. BERLINGS BOKTRYCKERI A.-B.
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This systematic work is an investigation of the fine and very interesting Crinoid material that was brought home by Dr. Sixten Bock's Japanese expedition of 1914 and which has kindly been delivered to me by Dr. Bock for determination. On many occasions the determination has been facilitated by comparison with the crinoids that Dr. Mortensen of Copenhagen has collected in the same regions and also kindly delivered to me for determination.

I am much indebted to Mr A. H. Clark of Washington for the very valuable information he has always readily rendered me. To Professor A. Wirén of Uppsala I also wish to express my thanks for the kind interest with which he has followed my investigations.

The translation has been made by myself with the assistance of my sister Miss Märtha Gislén. The work was afterwards revised by Mr Henry Alexander M. A. and to both these helpers I herewith offer my heartiest thanks.

Finally I beg to express my gratitude to Miss Sigrid Ohlsson and Miss A. Starup, who have kindly drawn in Indian ink the text-figures made by myself in pencil.

The points of view that I have followed in my investigation have chiefly been the same as I applied when revising the crinoid material brought home from Australia by Dr. Mjöberg, though I have been able to begin and complete the determination of the Japanese Crinoids with a deepened knowledge and also to apply a more tho-

roughly worked out systematical method. Thus I have for each species given a more or less detailed description of a typical specimen and for the rest of the individuals belonging to the same type I have given an account of the divergences from the normal type. I have also given numerical specifications for such characteristics as were the subject of statistical treatment.

What I have often felt as a deficiency is, that the authors of the species-descriptions within this group, especially during the last few years, have not given any specifications either as to which characteristics they have considered to be significant for the species or to which previously described species the newly described type might be most closely related. It has therefore become unnecessarily tedious to find out from the multitude of the stated characters those which are specific for the species. Because of this I have added to the description of every new species or variety a short summary and discussion of the characteristics that I have thought to be distinguishing ones for the species, and a statement as to which previously described species the new one might be most closely related to.

Since the days of the Challenger papers there are few works that have given any figures of the newly described Crinoids and in the cases where this has been done it is almost without exception only habitus-figures that have been reproduced as drawings or photos. When it is necessary to reproduce a habitus-picture of a Crinoid a photo is doubtlessly most suitable, n. b. if well taken. A picture of an entire animal must always involve great schematization, which becomes more visible in Crinoids than in other animals because the Crinoids consist of such an innumerable quantity of ossicles, the number, sculpture and form of which represent the proper genus and species characteristics. A good photo, on the contrary, can quite correctly reproduce a habitus-picture and, in addition, a good many of the more microscopical characters. But when it is a question of giving a complete picture of a newly described species the macroscopical photo is, however, not satisfactory alone, at least not in the case of a Comatulid species. Then one must also add to the habitus-picture drawings (or microphotos) to visualize the specific characters for the species, which one usually takes from the appearance, form, number and size of the Cd and cirrals; from the sculpture of the arms and especially

from their proximal parts; from the occurrence of the pinnules and their relative size and ornamentation. It will therefore be seen that in most species I have given drawings of Cirri, of the proximal and distal pinnules that are especially characteristic, and of Br joints and Centrodorsals, where they have any characteristic sculpture or otherwise show any appearance specific for the species.

As to the systematical classification I have followed A. H. Clark's system. Though in some particular cases this perhaps needs criticizing, still it is certainly right in its principal traits. In his large work on the Comatulids of the Siboga Expedition, Clark has brought together a good many of his systematical observations previously published in numerous investigations and now one can more easily estimate the value of the new system. In certain cases he has perhaps, however, gone too far in subdividing the genera; the recent known Crinoids comprising about 600 species are distributed in 132 genera. The apparent disproportion between the number of species and genera will in the future be diminished by new expeditions adding many new species to the small genera. By this the division into genera will certainly persist in many cases, but on the other hand I do not think that in course of time one will be able to keep apart genera in which for instance the difference in genus *A* is only that P_1 is the longest pinnula, in $B : P_2$, in $C : P_3$.

Though I have studied about 40 of the above-mentioned genera, I do not consider that I have yet sufficiently detailed knowledge to put the system through a suitable criticism and apply new restrictions to certain genera. Besides, it seems to me as if the study of the inner anatomy (in the Comatulid genera and families still quite a *terra incognita*) ought to precede a discussion of the mutual relation between the different groups. I hope in the future to be able to begin this study and throw some light upon the matter.

Dr. Bock's Japanese Expedition brought home 53 different species and varieties of Crinoids, distributed in 29 genera. I have given below a list of the contents of the collection and at the same time the depths at which the specimens were swept. (In the case of the specimens from Kiu-Shiu there are sometimes no statements of the

depths, but according to Dr. Bock they are said to be taken from at most a depth of 200 metres)[1].

Comatella brachycirra n. sp. 145—209 metres
Comatella maculata (P. H. Carp.) 145—182 metres
Comatella stelligera (P. H. Carp.) 145—209 metres
Commissia peregrina var. maginifica n. var. 192 metres
Comissia parvula A. H. Clark 209—728 metres
Comissia gracilipes A. H. Clark 728 metres
Comissia ignota var. minuta n. var. 127—209 metres
Comaster delicata var. grandis n. var. 72—182 metres
Comaster serrata A. H. Clark 127—209 metres
Comantheria grandicalyx (P. H. Carp.) 54—72 metres
Comantheria grandicalyx var. flagellipinna n. var. 20—63 metres
Comanthus solaster A. H. Clark 2—4 metres
Comanthus pinguis A. H. Clark 136 metres
Comanthus (Vania) annulata (Bell) 127 metres
Comanthus (Vania) parvicirra α comasteripinna (Müller) n. n. 0—63 metres
Comanthus (Vania) parvicirra β comanthipinna n. subsp. 63 metres
Catoptometra Hartlaubi A. H. Clark 245 metres
Catoptometra magnifica var. minor n. var. 127—182 metres
Eudiocrinus indivisus Semper 182 metres
Eudiocrinus gracilis var. pulchellus n. var. 127—182 metres
Eudiocrinus Loveni n. sp. 145 metres
Liparometra grandis A. H. Clark, ?—145 metres
Cenometra bella (Hartlaub) 63 metres
Cyllometra disciformis (P. H. Carp.) 162—728 metres
Cyllometra manca (P. H. Carp.) 47 metres
Cyllometra albopurpurea A. H. Clark 163—182 metres
Cyllometra pulchella n. sp. 136—163 metres
Tropiometra afra var. macrodiscus (Hara) 3—5 metres
Tropiometra encrinus (Lütken) 163 metres
Neometra multicolor A. H. Clark 163 metres

[1] The statements as to the depths, according to Dr Bock, ought not to be taken too strictly, with the exception of the depths from the Kiu-Shiu locality. In other cases they only signify the length of the wire let out of the trawl.

Pectinometra flavopurpurea A. H. Clark 364—728 metres
Pterometra trichopoda A. H. Clark 145—182 metres
Asterometra macropoda A. H. Clark 163 metres
Asterometra anthus A. H. Clark 127—209 metres
Stenometra dentata n. sp. 182—209 metres
Crossometra septentrionalis A. H. Clark 364 metres
Perissometra aranea n. sp. 200 metres
Diodontometra Bocki n. gen. & sp. 209 metres
Compsometra parviflora A. H. Clark 127—145 metres
Compsometra serrata A. H. Clark 0—3 metres
Toxometra æquipinna n. sp. 273 metres
Iridometra melpomene A. H. Clark 182—728 metres
Dorometra nana (Hartlaub) Diver (about 0—5 metres)
Dorometra briseis A. H. Clark 728 metres
Dorometra parvicirra (P. H. Carp.) 145—163 metres
Psathyrometra Wireni n. sp. depth?
Erythrometra rubra A. H. Clark 163 metres
Clarkometra elegans n. gen. & sp. 127—163 metres
Thaumatometra comaster A. H. Clark 273—728 metres
Metacrinus nobilis var. tenuis n. var. 182—400 metres
Metacrinus rotundus P. H. Carp. 182—254 metres
Metacrinus interruptus P. H. Carp. 145—400 metres
Metacrinus interruptus form. ornatus new form 182—400 metres.

If I disregard *Compsometra serrata*, which is also found on the shore at Shimonoseki, the above-enumerated species are scattered over 3 different localities. These 3 localities are the Sagami Bay, the district round the Goto Islands, and the Bonin Islands.

From Sagami the following species were brought home: 1) *Comissia parvula*, 2) *C. gracilipes*, 3) *Comanthus solaster*, 4) *C. parvicirra a comasteripinna*, 5) *Liparometra grandis*, 6) *Cyllometra disciformis*, 7) *Tropiometra afra macrodiscus*, 8) *Pectinometra flavopurpurea*, 9) *Crossometra septentrionalis*, 10) *Compsometra serrata*, 11) *Toxometra æquipinna*, 12) *Iridometra melpomene*, 13) *Dorometra briseis*, 14) *Thaumatometra comaster* and 15) *Metacrinus rotundus*. Further there is a young Comasterid from a great depth, which is probably *Comatulides decameros* sp. juv. In all therefore 15 or 16 species from Sagami, one of which is new (N:r 11).

From Kiu-Shiu and the Goto Island are collected: 1) *Comissia parvula*, 2) *Comanthus pinguis*, 3) *Catoptometra Hartlaubi*, 4) *Cyllometra manca*, 5) *Cyllometra pulchella*, 6) *Neometra multicolor*, 7) *Asterometra macropoda*, 8) *Perissometra aranea*, 9) *Psathyrometra Wireni*, 10) *Erythrometra rubra*, 11) *Metacrinus nobilis tenuis*, 12) *M. interruptus*, 13) *M. interruptus form. ornatus* and 14) *M. rotundus* or 14 species, including 3 new species and a new form. N:r 1 und 14 are common with the Crinoid fauna of the Sagami bay, n:r 11, 12 and 13 with that of the Bonin Islands.

From the Bonin Islands there are:
1) *Comatella brachycirra*, 2) *C. maculata*, 3) *C. stelligera*. 4) *Comissia peregrina magnifica*, 5) *C. ignota minuta*, 6) *Comaster delicata grandis*, 7) *C. serrata*, 8) *Comantheria grandicalyx*, 9) *C. grandicalyx flagellipinna*, 10) *Comanthus annulata*, 11) *C. parvicirra α comasteripinna*, 12) *C. parvicirra β comanthipinna*, 13) *Catoptometra magnifica minor*, 14) *Eudiocrinus indivisus*, 15) *Eu. gracilis pulchellus*, 16) *Eu. Loveni*, 17) *Liparometra grandis*, 18) *Cenometra bella*, 19) *Cyllometra albopurpurea*, 20) *C. disciformis* 21) *Tropiometra encrinus*, 22) *Pterometra trichopoda*, 23) *Asterometra anthus*, 24) *Stenometra dentata*, 25) *Diodontometra Bocki*, 26) *Compsometra parviflora*, 27) *Dorometra nana*, 28) *D. parvicirra*, 29) *Clarkometra elegans*, 30) *Metacrinus nobilis tenuis*, 31) *M. interruptus*, 32) *M. interruptus form. ornatus*. Among these 32 species there are 2 belonging to new genera, 5 new species, 7 new varieties, and one new form. N:r 11 and 17 are also found in the Sagami-list, N:rs 30, 31 and 32 in the one from the Goto Islands.

As to the Sagami-species one can note some forms from a depth of 100—400 fathoms (182—728 metres) which have not before been found north of the archipelago of the Sunda-Islands. Probably it is the warm Kuro-Shio stream which passes northwards along the eastern shore of Japan that has brought up the larva-stages of these southern species and that makes their duration in this northern waters possible. According to the statement of Mr A. H. Clark and the holothurian specialist Dr. H. Ohshima a southern woof continues to assert itself in the marine fauna up to the Sendai Bay, i. e. somewhat north of the 38th latitude. The prominent point and Kingwa-San here prevent further penetrating of the warm water and of southern forms and marks the northern boundary of Indo-pacific animals. *Comissia parvula* was previously found at the Philippine Islands and the smaller Sunda-Islands at a depth of 73—522 metres. In the Bockian Collections the species

was swept from Sagami at a depth of 209—728 metres. *Comissia gracilipes*, collected at the Kei-Islands at a depth of 595—984 metres, is found at Sagami at 728 metres. *Cyllometra disciformis* occurs at the Philippines from 0—325 metres, at Sagami the species is found from 182—728 metres and, finally, *Toxometra* at the Philippines and the Sunda-Islands, where the genus is represented by the species *paupera*, occurring at a depth of 0—502 metres, was brought home from Sagami from 273 metres.

A woof of southern forms is also visible at the Goto Islands by the occurrence of the species *Cyllometra manca*, *Psathyrometra Wireni*, *Metacrinus interruptus* and *M. nobilis var. tenuis*.

The Crinoid fauna of the Bonin-Islands was quite unknown before. The 32 species that have been brought home from these islands, show that the crinoid fauna forms a mixture between the South Japanese fauna and that of the Sunda Islands and Oceania with a woof of some more peculiar and diverging forms. South Japanese species or ones closely related to these are *Comatella brachycirra*, *Comaster serrata*, *Comantheria grandicalyx*, *Cyllometra albopurpurea*, *Asterometra anthus* and *Stenometra dentata*. Most of the rest are represented by the same or closely-related forms in the waters round the Sunda islands and the Philippines or belong to species with ubiquitous distribution. *Eudiocrinus gracilis*, formerly reported from Burma, is represented by a somewhat diverging form. Of the same genus there is a new species *Eu. Loveni*, which reminds one both of *Eu. gracilis* and *venustulus*, but is otherwise a special type. It is strange that a variety of the East African *Comissia ignota* is found at the Bonin Islands. As a parallel in the distribution one might quote *Tropiometra afra* and *Tropiometra afra macrodiscus*. Both the new genera of the collection also originate from these islands. The genus *Diodontometra* is a *Charitometrid* form, most closely related to *Charitometra*, a genus known from great depths at the Kermadec and Fiji islands, though the new genus differs from *Charitometra* by having XX arms and a double opposing spine, an almost unparallelled condition, formerly observed only in the genus *Epimetra* fam. *Colobometridæ*. The new genus *Clarkometra* is also interesting especially from an animal-geographical point of view. The genus belongs to the subfamily *Perometrinæ* of *Antedonidæ* and is most closely related to the East American genus *Hypalometra*,

from which it differs, however, in several characteristics. A small number of genera from the Indian ocean are already known with corresponding types in the Caribbean sea. The above-mentioned genera still show a couple of these interesting correspondences.

Some of the species found at the Bonin islands (e. g. *Tropiometra encrinus*, *Vania annulata*) are met with here at greater depths than those formerly reported in the literature.

A tendency to abbreviation of the cirri can be traced in several species from the Bonin islands. Thus *Comatella brachycirra, Catoptometra magnifica minor, Eudiocrinus gracilis pulchellus*, and *Stenometra dentata* differ from closely related forms by the cirri being unusually short in comparison with the arms (compare several newly described species in CLARK's Siboga work, where in forms from the Sunda islands an opposite tendency prevailed).

Some of the Bonin localities seem to have had a very rich crinoid fauna. From St. 59 one notes no less than 13 species. It may be of some interest to note that while the crinoid fauna from this rich locality only shows full-grown specimens, the list from e. g. St 47 only includes the young of large species and mature individuals of small forms. Obviously a current favourable for the one as well as for the other has brought larvæ of numerous forms. In the latter case quoted this has occurred rather recently and it is therefore only the small species that have reached maturity.

The collection as a whole gives a good idea of the abundance of crinoids that prevails in Japanese waters.

The family *Comasteridæ* is represented by 16 species, one of which is a new species, and 5 can be considered as new varieties. In the systematical investigation of this family I have discussed in special detail the forms of *Comanthus (Vania) parvicirra* and the value the characters may have in this sub-genus. The collection is rich in young forms and an especially great number of young Comasterids have been placed at my disposal. All these young forms, like all young forms of Comasterids, are exceedingly difficult to identify and one may usually think oneself very fortunate if the young Crinoid is determinable as to genus. Hitherto descriptions are chiefly published only for grown-up forms and therefore the characteristics that might possibly be used to distinguish young ones are unnoticed or unknown. If the fauna

at a certain place is approximately known and evolution-series are brought home, the prospects of identifying young forms are considerably brighter. I therefore considered it of a certain interest to make a combination of the young Comasterid forms from the Bonin Islands and, partly by comparing them with one another, partly by studying given evolution-series, try to produce the characteres that might be of systematical value. Thus, among other things, I think I have found that the appearance of the disk can give certain fixed points for judging the systematic position of the young Comasterids.

The family *Zygometridæ* is represented by 5 forms including one new species and two new varieties. As always, here too I have been very cautious in establishing new species and have preferred to set up a new form as a variety rather than as a species if the distinguishing characteristics have seemed to me to be less decided or I have otherwise had any doubt about the value of the distinguishing marks quoted. Therefore it is very possible that some of the new forms described as varieties will in future turn out to be new species.

Of the families *Mariametridæ, Colobometridæ, Tropiometridæ* and *Calometridæ* there are, except *Cyllometra pulchella* n. sp., only previously known species with a number of species 1, 5, 2 and 2 respectively. *Cyllometra disciformis* is swept from greater depths than were previously known and because of this the cirrals are exceptionally short in correspondence with A. H. Clarks statement on the Siboga material. *Antedon macrodiscus*, described by the Japanese Hara 1895, I have put as a variety under *Tropiometra afra*, from which it only differs by having a greater number of cirrals, a character that in this case I cannot consider to have a species-distinguishing value, as it is the only differing one. The relation between the genera *Calometra* and *Neometra* I have discussed in connection with the description of specimens of *Neometra multicolor*.

The family *Thalassometridæ* appears with 4 species, one of which is new, *Stenometra dentata*, in a certain way intermediate between the genera *Stenometra* and *Daidalometra*. Of *Asterometra anthus* I have had an opportunity to study a very rich material, which has been subjected to statistical investigation. This has given the result that both the Clarkian species *A. acerba* and *A. lepida* cannot be considered as forms differing from the above-mentioned species but might become absorbed

in *A. anthus*. Both in this and in the first-mentioned, newly described species there are some very tender young forms with defective pinnulation and orals not yet resorbed. I have also observed these ossicles in some small *Comasterid* youngs and in a young *Compsometra serrata*.

Of *Charitometridæ* there are 3 species, one of them belonging to a new genus, the above-mentioned *Diodontometra*. Moreover a new species of the genus *Perissometra* is also described.

The family *Antedonidæ* counts in the collection 12 species, distributed over 4 sub-families: 1) *Antedoninæ:* 7 species, including a new one, 2) *Zenometrinæ:* one species (new), 3) *Perometrinæ:* 2 species (one new genus, the above-mentioned *Clarkometra)* and 4) *Batymetrinæ:* 1 species.

Compsometra serrata as also the above-mentioned *Cyllometra pulchella* were brought home in great numbers and the statistical investigation that I have carried out shows here, as almost every where when one has to do with nearly fullgrown crinoids, an astonishing constancy in the number of cirri, cirrals, pinnulars, etc. A certain variability is, however, always visible and to establish its range seems to be of rather great importance. *Psathyrometra Wireni* is peculiar in so far as it has sexual products on P_2, a character restricted otherwise to the subfamily *Bathymetrinæ* or occurring exceptionally in *Antedoninæ*.

Of stalked Crinoids there are only representatives for the Pentacrinoid genus *Metacrinus*, which is represented by 4 different species or forms (including a new variety and a new »form»). *Metacrinus Stewarti* for reasons quoted is considered to be an unimportant form-deviation from the *M. rotundus* type and is therefore treated as a synonym of this species. As to *M. interruptus* (P. H. CARP.) I have on the contrary considered that there are reasons for not agreeing with Mr. SPERRY's views as to the identity of this species with *M. rotundus* and I have therefore treated it as a separate species.

The material of *Metacrinus*-forms is extraordinarily fine and interesting from an ontogenetical point of view. A young specimen of *M. interruptus* may be the youngest known specimen of a *Metacrinus* species and shows many interesting conditions of organisation. In a couple of species it has been possible to follow the increase in the thickness of the stem and an estimate of the total length of the grow-

ing stem has given figures from 2 to 2,5 metres. It is, however, to be noticed that large forms, such as *M. rotundus*, probably have stems which during their increase of thickness become a good deal longer. Concerning both the first-mentioned species and the latter ones it is very possible that the length-increase of the stem is continued *even after* the increase of thickness has ceased. A couple of measurements have shown that the thickness of the stem can even decrease proximally, which ought probably to be regarded as a phenomenon of old age. The study of the components of the division-series has led to interesting results which will be treated in a special investigation in connection with the question of the new formation and augmentation of the number of arms in the genus *Metacrinus* and in the discussion of the relation between pinnulæ and arms.

Concerning the terminology I have used the same names as in my work upon the Mjöbergian Crinoids, i. e. about the same as Bather, A. H. Clark etc. have employed.

Thus R (the radial) is the first ossicle of the arm. The ossicles between the radial und the first arm-ramification are denoted as primibrachials 1, 2, etc. (I Br 1, I Br 2). The last ossicle before this arm-division is an axillary (I Brax), carrying on its distal surface two secondary arms. If the animal has only X arms there are no further arm-ramifications, otherwise after the I Brax the secundibrachials (II Br:s) follow with the 2 nd, 4 th or, among the stalked crinoids, even a more distal segment forming an axillary. On this a new division-series, the tertibrachial (III Br), may possibly arise, then perhaps a IV Br series and so on. The segments of the arm-branches that are not further divided are signified as brachials (Br) with the number of the segments counted from the last axillary.

The number of the Cirri (C) as well as of the arms is written in roman figures, the number of the segments in arabic ones. By the word »whorl» in the description of cirri I mean their arrangement in a horizontal line, but I speak of »row» when referring to their arrangement in a vertical line.

The pinnules (P) are denoted on the outside of the arm by ordinals, on the inside they are indicated by letters (a, b, c). I Br (Costal), II Br (Distical), III Br (Palmar), and IV Br (postpalmar) pinnules I

have, however, contrary to my procedure in the Mjöbergian work, denoted by P_I (= P_C), P_{II} (= P_D), P_{III} (= P_F) and P_{IV} (= P_{PP}).[1]

In order to demonstrate the ramifications of the arms I have used the same schemes that I demonstrated in my Mjöbergian investigation. In these schemes synarthries are indicated by hyphens, syzygies by the plus sign. Though synartries and syzygies have different marks they can, however, in certain species pass over to each other to an unlimited extent and in such dubious cases I have often put a query instead of one of the above-mentioned marks. The »pseudo-» syzygy when fully developed is denoted as a »true» syzygy. Roman numerals signify the number of division-series, thus for instance II = II Br, arabic ones = the ordinals of the segments. Br as usual = brachial, R = radial. I have marked the regenerate by adding an index to the number of the segment. The index mark 1 forms the sign of a first regeneration, 2 of a second one and so on. The distribution of the pinnules is indicated by horizontal lines which are applied below or above the symbol of the segment according as the pinnula is fixed inside or outside the arm.

The abreviations that I have used are the following:

B = basale
Br = brachiale
C = cirrus
Cd = Centrodorsale
IR = interradially
P = pinnula
R = radiale
br = breadth
h = height
L = length
N = number
S = number of segments
T = teeth.
D = Dorsal cirrus whorl
V = Ventral cirrus whorl

[1] For the pronunciation of these symbols I suggest: primi-p., secundi-p., terti-p etc

Comasteridæ A. H. Clark.

Subfam. Capillasterinæ A. H. Clark.

Comatella A. H. Clark.

C. brachycirra n. sp.

Fig. 1—3. Photo 1.

From St. 53 (5 sp.), 55 (2 sp.), 56 (2 sp.), 59 (7 sp.) = 16 specimens.

Sp. 1 (St. 56) Cd flattened, free dorsal surface small, smooth, peripherically somewhat furrowed, diameter 1,5 mm.

Cirri XVIII, 10—12; 5—7 mm, in a close, irregular whorl (most are broken). The first segment somewhat shorter than long, 2d segment L = 2 × br, somewhat hour-glass shaped, 3d and 4th segments L = 3 — 3 1/2 × br. (4th segment with the disto-dorsal part bent outwards), 5th segment L = 2 × br, 6th and following segments L about = br with unimportant, obtuse, dorsal spines. The dorsal spines of the two last segments more pointed. Terminal claw strongly bent, quickly tapering, L = 2 × the penultimate segment.

B—s appearing IR as knobs. R—s almost hidden by Cd on the middle, or presenting themselves as narrow bands.

I Br 1 L = 1/3 br, laterally free, united with I Br 2 by a synarthry. I Brax h = 2/3 br, forming a low pentagon, the distal margins a little bent outwards. The II Br:s are 2, appearing in 2 cases (the arms are partly broken). Arms at least XII, 50—60 mm:s.

Br 1 on their inner side standing together or free, 6—7 first Br-segments discoidal then oblique joints, h (the longest) = br. Syzygies 1 + 2 on the inner side of the ramifications on the II Br:s, 3 + 4 on the outer side, then 12 + 13, 17 + 18, 21 + 22 etc. with an interval of 3 oblique joints. The breadth of the arms is 0,8 mm. 16 Br-segments pro cm (12 if the syzygial pairs are counted as units) in lateral view not overlapping. The bases of the arms remarkably smooth.

P_1—P_3 with a comb. P_1 22 (+ 7 T, their L = 1 1/2 × the br of the segment) 5,5 mm. (Segments 1 and 2 short, the following ones ≥ br), P_2 17 (6 T) 3,5 mm., P_3 + 17 (6 T) 3,5 mm., P_4 16; 4,5 mm. a little spiny, P_6 14; 3,5 mm. Distal p-s. 18; 5—6 mm:s (1 segment short, the following ones L = 1 1/2 br; unimportant hooks on the last segments, compare the figure).

Mouth central. Disk 4 mm., dark brown with lime-granules. Anal funnel short, 1,2 mm. The arms a lighter, uniform brown (in spirit).

Sp. 2 (St. 56) C. XVI, 11; 6,5 mm. The arms XV, 35—40 mm. P_1 24 (8 T) 6 mm. P_2 19 (6 T); P_3 18 (6 T) 4 mm. The distal p. 15; 6 mm., Cd. peripherically rutty. Disk 3,5 mm.

Sp. 3 (St. 59) C. XXV 11; 6—7 mm. C. in two whorls. The arms XIV + 60 mm. P_1 22—24 (8 T) 7 mm. The distal p. 20; 7,5 mm., P_5 15; 4 mm. without a comb.

Sp. 4 (St. 59) C. XVII, 9—11; 4—6 mm. The arms XIV or XV, 50 mm. P_1 25 (7 T) 5,5 mm. P_2 and P_3 with 5—6 T, P_4 14; 3,5 mm. Distal p. 17; 5,5 mm.

Sp. 5 (St. 59) C. XX 10—11; 4,5—7 mm. The arms more than XII, broken. P_1 23 (7 T) 5,5 mm.

Sp. 6 (St. 59) C. XII in a single whorl. The arms XII, 50 mm. P_1 23 (7 T) 5,5 mm. P_2 18 (6 T) 3,2 mm., P_3 18 (5 T) 3,2 mm., P_4 14. Distal p. 15; 5,5 mm. Disk 3,5 mm. The specimen somewhat more slender than the foregoing ones. The Br-segments in the distal arm-part L = 1 1/2 br, somewhat spiny in the distal margin.

Sp. 7 (St. 59) C. XV 11; 5 mm. The arms XIII, 45 mm. P_1 22 (8 T) 5 mm., P_2 19 (7 T) 3,5 mm., P_3 6 T, 3 mm. Distal p. 18; 6,5 mm.

Sp. 8 (St. 59) C. XXI, 10—11; 5—6 mm. The arms > XII. P_1 28 (7 T) 5,5 mm. P_2 22 (7 T), 3,7 mm., P_3 21 (7 T) 3,5 mm., P_4 14; 3,5 mm. Distal p. 12; 3,5 mm. In this and the following specimen shorter Br-segments which are bent more outwards.

Sp. 9 (St. 59) C. XVII, 10—11; 4—5 mm. The arms XII +, 25—30 mm. P_1 23 (8 T) 4,5 mm., P_2 21; 3,5 mm., P_3 20 (7 T) 3,5 mm. Distal p. 15; 5 mm.

Sp. 10 (St. 55) Cirri XVIII 10—11; 6 mm. The arms XIV, 70 mm. P_1 8 T, 6 mm., P_2 21; 5 mm. P_4 15; 4,5 mm. Distal p. 18; 7 mm.

Sp. 11 (St. 55) C. XVIII 10—11, 5,5—6,5 mm. The arms XIII, 60 mm. P_1 25 (8 T) 6 mm., P_4 15; 4,5 mm. Distal p. 20; 7 mm.

Sp. 12 (St. 53) C. XIII 11; 7 mm. The arms XVIII, 65—75 mm. P_1 25—27 (8—9 T) 6 mm., P_2 22, P_3 21 (6 T) 4 mm., P_4 15. Distal p. 18; 7 mm. Occasionally P_4 with a comb 5 T, 17 segments. The specimen is lighter coloured. Perhaps a hybrid with some of the following species. The Br-segments somewhat more spiny than those of the preceding specimens.

Sp. 13 (St. 53) C. XVII 10—11, 5—6 mm. The arms XV, 45 mm. P_1 7 T, P_2—P_3 with teeth. Distal p. 16; 5 mm. These sp. and the 3 following ones more reddish-brown than the preceding.

Sp. 14 (St. 53) C. XIV 10—11, 5—6 mm. The arms XV, 50 mm., P_1 7 T, P_2 (and P_3) with teeth. Distal p. 17; 5,5 mm.

Sp. 15 (St. 53) C. XVII 10; 6 mm. The arms X, 55 mm., P_1—P_3 with teeth. Distal p. 19; 6 mm.

Sp. 16 (St. 53) C. XIV 10; 5 mm. The arms XV, 20 mm. P_1 20 (6 T) 3,5 mm., P_2 is sometimes lacking, P_3 always absent. Distal p. 12; 3 mm. Disk 2,5 mm.

An illustration of the division of arms from Sp. 2.

I 1—2
- II 1—2
  - Br 1—2 3 + 4 . . . 16 + 17 . . . 21 + 22 . . 25 + 26 . . .
  - Br 1 + 2 (4 + 5) . . . 13 + 14 . . 17 + 18 . . 21 + 22 . . .
- II 1—2
  - Br 1 + 2 . . . . 13 + 14 . .
  - Br 1—2 3 + 4 . . . 13 + 14 . . .

In sp. 7 exceptionally one case with II Br 4 (1—2 3—4)

I 1—2
- II 1—2
  - Br 1—2 3 + 4 . . 13 + 14 . . .
  - Br 1—2 3 + 4 . . . 12 + 13 . . .
- II 1—2 3—4
  - Br 1—2 . . . 11 + 12 . . 15 + 16 . . 19 + 20 . .
  - Br 1, 2 + 3 . . . 10 + 11 . . . 14 + 15 . . 18 + 19 . . .

Cd varies in diameter between 1 and 2 mm. Cirri appearing in one or two whorls. Cirrale 2 : L = 1 1/2 — 2 × br; Cirrale 3 : L = 2 1/2 — 3 × br; Cirrale 4 : L = 3 1/2 × br; Cirrale 5 : L = 1 1/2 — 2 × br.

This species is most closely related to *C. decora* A. H. Clark from Japan but is separated from this species, by 1): the cirri, which

compared with the arms are much shorter and always have 10—11 segments (with very long 3d and 4th segments) instead of 12—13, 2) never III Br:s, 3) syzygies between Br 1 and 2 or 3 and 4, only exceptionally between 2 and 3, 4) P_1 is much shorter and with fewer segments in *C. brachycirra* than in *C. decora*. Teeth 6—9 instead of 12. 5) P_1—P_3 with a comb (*C. decora* has teeth on P_1—P_6).

Comatella maculata (P. H. CARP.).

Syn.: see Siboga Exp. Vol. 42 B (A. H. CLARK: Unstalked Crinoids) p. 7.

Fig. 4—6.

From St. 53 (1 sp.) 59 (2 sp.) = 3 specimens.

Sp. 1 (St. 59) Cd 3,5 mm., free dorsal pole 2,5 mm. Cirri XXI, 19; 10—12 mm. in a single or double whorl. First and 2d segments short, 3d cubical, somewhat hour-glass-shaped, 4th a little longer, 5—7th segments L = 1 1/2 br. Then shorter segments again with dorsal spines. Penultimate segment L = br. Terminal claw coarse L = 1 1/2 × the foregoing segment. A young cirrus has the 4—7th segments somewhat longer, L = 2 × br.

B-s and R-s as in the preceding species. I Br 1 h = 1/5 br. laterally free. I Brax h = 1/3 br, the border against II Br 1 a little bent outwards. I Br 2 forms with I Br 1 a small synarthrial tubercle. II Br:s are 2.

The arms are XV (or perhaps XVI), partly broken, 65 mm. Primipostaxillaries inside for the most part united. Syzygies 1—2, 3 + 4, 14 + 15, 23 + 24 or 13 + 14, 18 + 19, then with an interval of 5 to 6 oblique articulations. The proximal part of the arm not quite smooth. Br:s 1—8 discoidal, then oblique joints. Distal segments tolerably short, the margins a little spiny and somewhat bent outward like a collar. 16—17 segments pro cm (If syzygial pairs are counted as units there are 14) Breadth of arms 1,2 mm.

P_1—P_6 with combs. P_1 36—38 (18 T) 9 mm. Teeth rather narrow, 1/2—1/3 of the segment's breadth. P_2 ± 30 (15—17 T) 6,5 mm., P_3—P_5 with decreasing length. P_6 22 (12 T) 4,5 mm. Distal p. 17—18: 5—6 mm.

Disk 8 mm. Anal funnel 1,5 mm. Mouth and anus subcentral. Colour dark brown, regenerated parts white.

Sp. 2 (St. 59) Cd. 3 mm., pentagonal, flat dorsal pole 2 mm.

C. XXV 15—19; 9—11 mm. The 4th—5th segments are the longest L = 1 3/4 br, 6th segment a little shorter, a transition segment. After this (as in sp. 1) highly polished segments.

The arms are XIII, 55 mm. Syzygies with an interval of 4—6 oblique articulations.

P_1 38 (19—22 T) 9 mm., P_4 30 (± 18 T) 7,5 mm., P_5 17; 4,5 mm. and P_6 15; 4 mm. without combs, but with dorsal hooks and as in the preceding p. with small spiny knobs on the outer side of the proximal segments. Distal p. 19; 6 mm. The 6 last segments with dorsal hooks. The segments somewhat longer than broad, with spiny borders. — Disk 6,5 mm.

Sp. 3 (St. 53) C. XXIII 15—16 (D), 17—18 (V), 7—9 mm. The 4th and 5th segments longest, L = 2 × br. From the 5th segment a dorsal transverse crista.

The arms X, 40 mm. +. Syzygies with an interval of 5 to 6 oblique joints. Axillary h = 1/2 br. I Br 1 h = 1/5 br. Primipostaxillaries free inside.

P_1—P_4 with a comb. P_1 30 (18 T) 5 mm., P_2 ± 13 T, a little shorter. P_3 and P_4 with still shorter combs, P_5 11; 3 mm. Distal p. 13; 5 mm.

Disk 5 mm. Mouth subcentral.

The base of the arms tolerably smooth. Synarthrial tubercles unimportant. The arms as in the preceding specimens rather coarse. Distal Br-segments a little overlapping, not bent outwards, with spiny borders.

The specimens agree with those of Carpenter and Clark except that the joint between Br 1 and 2 is of a synarthrial not of a syzygial nature and that the proximal pinnules are somewhat shorter.

Comatella stelligera (P. H. Carp.).

Fig. 7—9.

Syn.: see Siboga Exp. 42 B, A. H. Clark, Unstalked Crinoids, p. 5.

From St. 43 (1 sp.) 56 (1), 59 (2) = 4 specimens.

Sp. 1 (St. 59) Cd discoidal 3,7 mm. Free dorsal surface 2 mm. C. XXVIII 20—24, 15—20 mm. in two whorls. 1st and 2d segments shorter than long, 3d one somewhat longer, like the nearest one following in the centre a little squeezed together, 4th—6th segments L = $\pm$ 1 1/2 br, 7th segment a transition segment, the 8th and the following ones highly polished. From the 7th segment a small dorsal spine, which at first consists of a minute, transverse, spiny crista, about the 11th segment constricted to a simple spine protruding from the distal part of the segment. Distal cirrals L = 1/2—2/3 × br. The height of the spine = 1/4—1/3 of the breadth of the segment. Opposing spine more pointed and a little smaller than the preceding ones. Terminal claw curved L = 1 2/3 × the penultimate segment.

R-s visible as narrow bands. I Br 1 h = 1/3 × br, baso-laterally united, like all the following ossicles of the proximal part of the arm with the ends somewhat thickened, bent outwards, and with small spines. A distinct synarthrial tubercle. I Brax triangular or low pentagonal, h = 1/3 br, laterally somewhat squeezed together. II Br-s are 2, appearing in 8 cases. II Br 1 as Br 1 on the inside united. Br 1 and 2 narrow, a little broader on the outside. After Br 7 oblique segments with the distal margins widened, overlapping and spiny. An example of the arm-ramification (a little differing in one branch) is given below.

$$\text{I } 1\text{—}2 \begin{cases} \text{II } 1\text{—}2 \begin{cases} \text{Br } 1\text{—}2\ 3+4_1\ 5_1+6_1 \ldots\ldots 26_1+27_1 \ldots 36_1+37_1 \ldots \\ \text{Br } 1-2\ 3+4 \ldots\ldots\ldots\ldots\ldots\ldots\ldots 31+32 \ldots \end{cases} \\ \text{II } 1\text{—}2 \begin{cases} \text{Br } 1-2\ 3+4 \ldots\ldots 16+17 \ldots 23+24 \ldots 32+33 \ldots \\ \text{Br } 1\text{—}2\ 3+4 \ldots 17+18 \ldots 25+26 \ldots 31+32 \ldots 40+41 \ldots \end{cases} \end{cases}$$

In some exceptional cases Br 1 + 2, 3 + 4 on the inner side of the divisions. Syzygies distally with an interval of 5—6 oblique joints. Arms XVIII, 80 mm. 17—18 segments pr. cm. (14—15 if the syzygial pairs are counted as units). Segments short, longest side L = 3/4 × br. The breadth of the segments 0,8—1,4 mm.

P_1—P_5 or P_6 with combs. P_1 + 37 (17—18 T) 9,5 mm., P_3 + 35 (+ 20 T) 6,5 mm. P_4 37 (Teeth from 11th segment), P_5 + 30 (T from 12th segment), P_6 28 (15 T) or 17 without a comb, 4,5 mm. Teeth tolerably high, narrow, h = 2/3 of the br of the segments. P_7 16. P_8 15; 4,2 mm. Segments not longer than broad. Proximal segments knobby and spiny, distally widened, not as in Carpenter's figure with a small wing-like process but with a longitudinal spiny crista. Distal p. 18—20; 5 mm. The last 4—5 segments on each p. with paired dorsal hooks.

Disk 10 mm. Anal funnel 2,5 mm. Mouth and anus sub-central. Disk smooth without incrusted granules.

Sp. 2 (St. 59) C. XX 14—18, 6—12 mm. in a whorl only partly double.

Arms XVI 65 mm. (VI young regenerated arms). Syzygies most often 1—2, 3 + 4 . .

P_1—P_4 with combs. P_1 31 (15 T) 6 mm., P_2 30 (17 T) 5 mm., P_4 23 (14 T) 4,2 mm. Teeth narrow, pointed. P_5 13; 4 mm. Distal p. 16; 5 mm., with small spines. The proximal parts of the arms somewhat smoother than in the preceding specimen.

Example of the arm-ramifications and distribution of syzygies in a somewhat abnormal arm.

I 1—2 { Br 1—2 3 + 4 . . 16 + 17 . . . 25 + 26 . . . 32 + 33 . . . 38 + 39 . . .
I 1 + 2 { Br 1 + 2 . . . 16 + 17 . . . 23 + 24 . . . 29 + 30 . . . 35 + 36 . . .
II 1 + 2 { Br 1—2 3 + 4 . . . 17 + 18 . . . 22 + 23 . . 26 + 27 . . . 31 + 32 . . .

To this species I have also referred a X-armed specimen differing chiefly only by being smaller than the ones described above.

Sp. 3 (St. 56) Cd very slight vaulted, 1 mm. C. XXV (III of them very small): 13 (D) 16 (V), 6—9 mm., usually in two whorls. 1st and 2d segments short; 3d one L = 1 1/2 br, a little hour-glass-shaped, 5th and 6th segments L = 2 × br with widened distal parts, 6th segment with a

spiny, transverse, dorsal crista which at the 10th one is constricted to a simple spine (h = 1/4 of the br of the segment). Terminal claw L = 1 1/2 × preceding segment, blunt, somewhat curved.

I Br 1 h = 1/3 br, laterally separated by the R—s. A weak synarthrial tubercle and a close articulation with the axillary. I Br 2 h = 1/3 br low pentagonal, distal margins form an obtuse angle. Arms X, about 35 mm. Br 1 and 2 in close articulation with one another. Br 1—6 discoidal, then oblique joints. Syzygies with an interval of 4—6 oblique articulations. The outer margins of the distal segments very much bent outward and finely spinous.

I 1—2 { Br 1—2 3 + 4 . . . 14 + 15 . . . 19 + 20 . . . 24 + 25 . .
I 1—2 { Br 1—2 3 + 4 . . . 14 + 15 . . . 19 + 20 . . . 24 + 25 . . 31 + 32 . . .

P_1—P_5 with combs. P_1 32 (18 T: h = or 2/3 of the segment) 6,5 mm. P_2 31 (18 T) 5 mm., P_3 24 (15 T) 4 mm., P_4 similar, P_5 24 (14 T) 3,5 mm. Distal p. ± 17; 4,5 mm. 3—5 distal segments with dorsal hooks.

Mouth and anus subcentral. Colour yellow-brown with white spots. Cirri white.

Sp. 4 (St. 43) C. XVIII 14—17, 6—10 mm. Dorsal spine from the 6th segment.

Arms XII, 55 mm. II Br:s are 2. Syzygies with an interval of 3—4 oblique joints. The segments fairly strongly collar-shaped and spiny.

P_1 and P_2 with long combs composed of 15—20 teeth. P_1 5,5 mm. P_2 4,5 mm., P_5 with ± 10 T: 3 mm., P_6 without a comb. Distal p. 13; 4 mm.

Mouth and anus subcentral. Disk 4—5 mm., brown-green. Calcareous parts lighter, olive-brown. Somewhat approaching *C. maculata* but with more slender arms.

The young forms of the above-described species are very similar to one another and probably cannot be distinguished from each other. Presumably the two last-described species pass through a stage with cirri built as in *C. brachycirra*.

A comparison between the characteristics for the species described above also shows that *C. maculata* comes near to *C. stelligera* and

except for the number of cirrals chiefly differs by having thicker and coarser arms, smoother arm-bases, and by having the distal Br-segments less bent outward.

It is to be supposed that the 3 species described above make hybrids. A specimen (Sp. 12) of *C. brachycirra* approaches the 2 other *Comatellas* by having somewhat spiny Br-segments. Compare also Sp. 4. of *C. stelligera*.

Comissia A. H. Clark.

C. peregrina var. magnifica n. var.

Fig. 10, 11. Photo 2.

From St. 59 : 2 specimens.

Sp. 1. Cd pentagonal with somewhat prolonged corners. Diameter 5,5 mm. Free dorsal part 2,5 mm. Height 1,5 mm.

Cirri thrown off, pits of XXXV—XL in 2 whorls.

R—s appearing as small flaps in the corners. I Br 1 h = 1/6 br laterally united with each other, forms with I Brax a low synarthrial tubercle as Br 1 with Br 2. Axillary h = 1/3 br, low pentagonal. Br 1 grown together inside. Br 2 on the outer side 3 × broader than on the inner side. Br 3 + 4 narrow bands; 4th and 5th segments form a weak tubercle directed inwards, 5th and 6th give rise to a similar one directed outwards; 6th—7th and 8th—9th form inward directed, 7th—8th and 9th—10th outward directed knobs, then rounded segments with more or less oblique articulations. Syzygies 3 + 4 . . 13 + 14 . . 17 + 18 etc. with an interval of 3 to 4 oblique articulations. Distal Br-segments triangular, the long side 2/3 × br. The arm-profile distally smooth, proximally somewhat serrate. Arms X, 150—170 mm. 16 segments pr. cm. (if syzygial pairs are counted as units 11 or 12). Breadth of the arms 2,5—1,3 mm.

P_1 50—55 (22—25 last segments rolled in a double spiral with large rather pointed teeth, h = the br of the segment. 2d—7th or 8th segments with dorsal knobs, weakly projecting. The remaining segments smooth, though distally weakly collar-shaped, not at all or only a little longer than broad) 17 mm., P_2 13 mm. P_3 and P_4 still some-

what shorter with combs which, as on all the comb-provided pinnules, are rolled a couple of turns; P_5 27; 12 mm. without a comb. Distal p. 25—28; 12—13 mm. The first 20—25 pairs of pinnules with the proximal segments distally somewhat bent outwards and with small spines. The segments of the distal p-s somewhat hour-glass-shaped, their ends distinctly spine-crowned. Last pinnulars with weak hooks.

Mouth subcentral. Anal funnel lateral, small, short, 2 mm. standing stiffly upright. Disk 11 mm. with small calcareous granules. Colour (in formol) yellowish brown.

Sp. 2. Cd more flat and rounded than in the preceding specimen. Diameter 5.5 mm.

C. broken. Pits of ± XXX ones in a single or double whorl. There are 5 segments of a cirrus left. These segments slowly increase in length, the 5th segment L about = 2/3 br., a little hour-glass-shaped. Arms X, 145 mm., most of them broken. Syzygies with an interval of 3 oblique articulations, 16 segments pr. cm.

P_1—P_4 with a comb, P_4 40 (22 T) 12 mm. Distal p. ± 30; 14 mm.

Though except for a small stump in Sp. 2 cirri are lacking, it is evident that both these specimens ought to be connected most closely with C. *peregrina*. From this species they differ, among other things, by having a more considerable size (Arm-length about 160 mm. against 120 mm. in the main species) and more cirri. Judging from the Clarkian descriptions the proximal arm-parts and pinnules also seem to be considerably more spiny. *C. peregrina* has also cirral 5 indicated as a transition segment, while the above-described specimen has a 5th cirral that does not show a trace of being a transition segment and has the br only 2/3 of the L. Presumably therefore the cirri are also longer and composed of more segments.

Comissia parvula A. H. CLARK.

Fig. 12—14.

Syn.: *Comissia parvula* 1912 A. H. CLARK Proc. Biol. Soc. Washington. Vol. 25, p. 19; 1918 A. H. CLARK Siboga Exp. Bd 42 B, p. 23.

From St. 4 (1 sp.), 8 (1), 36 (1), 37 (1) = 4 specimens.

Sp. 1 (St. 37) Cd discoidal, 2,5 mm., free part 1,5 mm.

C. XXI 10—13; 6,5—8 mm. in a partly double whorl. 1st segment shorter than long, 2d L = 1 1/2 br, 3d longest and narrowest L = 3 × br. 4th segment L = 2 br, 5th and the following ones broader and shorter L = 1 1/2 br. Antepenultimate segment L about = 1 1/5 br. A small dorsal knot from about the 5th segment. Opposing spine inconspicuous. Terminal claw curved, pointed, somewhat longer than the preceding segment.

R—s concealed. I Br 1 slightly visible, narrow bands, h about 1/6 × br. Axillary low pentagonal or triangular, h = 1/2 × br. Br:s 1 almost free inside. Br 2 about twice as broad on the outer side. After Br 7 or 8 oblique articulations. Distal segments smooth, not overlapping. Syzygies for ex: 3 + 4 . . 11 + 12 . . 14 + 15 . . 18 + 19 . . 22 + 23 etc. with an interval of 2 to 3 oblique articulations; 15 segments pr cm. (11 if the syzygial pairs are counted as units). Arms X, 45—50 mm. The breadth of the Br:s at the middle parts of the arms about 1 mm. The longer side of the distal segments = br.

P_1—P_3 with a comb. P_1 ± 30 (9—10 T) 7 mm., P_2 ± 26 (9 T) 6 mm., P_3 ± 25 (9 T) 4,5 mm. with a genital gland to the 4th segment. The height of the teeth about = the br of the segment, P_5 13; 4,2 mm. 3 to 4 last segments with dorsal prominences. Broad, coarse segments, the most proximal ones notched on the distal side and somewhat widened in the distal part, by which the bases of the pinnules somewhat resemble those of *Compsometra serrata*. Distal p. 17; 5,5 mm. The bases of the pinnules from P_3 to P_{20} swollen by gonads.

Disk smooth, 5,5 mm. Mouth central.

Sp. 2 (St. 36) Cd 2,5 mm., free dorsal part 1,5 mm. C. XXII 12; 5 mm. (only one cirrus left) in a single whorl. 3d segment longest L = 3 1/2 br. Distal segments laterally compressed and shorter. Antepenultimate segment a little longer than broad.

R—s appearing as small flaps in the corners. I Br 1 h = 1/8 br, latero-basally united with one another. I Br 2 low triangular, h = 1/3 × br. A weak synarthrial tubercle with close articulation between I Br 1 and 2. The arms X, smooth, broken, about 25 mm. Syzygies with an interval of 3 oblique articulations.

P_1—P_3 with a comb. P_1 26 (9 T) ± 4,5 mm., P_2 ± 22 (8 T) ± 3,5 mm. P_3 similar, 3 mm. Distal p. 13 segments. Disk 3 mm.

Sp. 3 (St. 8) C. ± XX 12—13; 5—5,5 mm. (some of the dorsal ones very small 9; 2 mm.; these have an antepenultimate segment whose L = 1 1/2 × br), 2d segment L = 2 × br, 3d L = 3 × br, 4th L = 2 × br; antepenultimate segment as in Sp. 2.

The arms X, 15—20 mm. I Br 1 h = 1/5 br. Axillary triangular h = 1/2 br. Br 1 + or — 2. Br 1 h = 1/3 br; Br 2 h = 1/3 br (on the outer side) or 1/5 br (on the inner side). Syzygies with an interval of 3 oblique articulations.

P_1—P_3 with a comb. P_1 ± 24 (10 T) 5 mm., P_3 17 (8 T) 3,5 mm. P_4 11; 3,5 mm. The segments coarse, smooth, somewhat swollen.

Sp. 4 (St. 4) A specimen corresponding to Sp. 1 which has crept into a calcareous sponge. C. 12; 5,5 mm. Antepenultimate segment L = br. Arm-length about 30 mm. P_1—P_3 with a comb.

Comissia gracilipes A. H. CLARK.

Fig. 15—17.

Syn.: *Comissia gracilipes* 1912 A. H. CLARK Proc, Biol. Soc. Washington. Vol. 25, p. 19; 1918 A. H. CLARK Siboga Exp. Vol. 42 B, p. 22.

From St. 35: 2 specimens.

Sp. 1. Cd 2 mm., free dorsal part 1,3 mm. C. XVIII 9—12; 4—6 mm. in a single whorl. 3d segment L = 3 × br, 4th segment L = 2 × br, a transition segment. Antepenultimate segment L = 1 1/2 br.

R—s and I Br 1 almost completely hidden by Cd. Axillary triangular h = 1/3 × br. Br:s 1 united inside, h = 1/4 × br, in close articulation with Br 2, the height of which (on the outer side) is 1/2 × br. Arms X, 35 mm. The br of the Br:s at the middle parts of the arms

0,6 mm. 16 segments pr cm. (12, if the syzygial pairs are counted as units). The longer side of the distal Br-segments = $1^1/_3 \times$ br.

P_1 25—27 (9—11 T) 5 mm., P_2 23 (11 T). Teeth somewhat longer, narrower and more pointed than in *C. parvula*. P_3 (16; 3 mm.) and the following ones without a comb with swollen pinnule-bases. Distal p. 13—15; 4—5 mm. The segments are long (L = 2 × br), swollen into knots at the ends. Disk 3,5 mm.

Sp. 2 Cd 1,8 mm. C. ± XX 9; 4 mm. (only one cirrus remaining). Antepenultimate segment L = $1^1/_2 \times$ br.

R—s concealed. I Br 1 appearing at the margin of Cd. Axillary h = $^1/_3$ — $^1/_4 \times$ br, with strongly concave distal sides. Br 1 + or — 2. Br 1 only united by skin on the inside. Arms rather smooth, broken, X, probably about 15 mm. Syzygies with an interval of 3 oblique articulations.

P_1 and P_2 with combs. P_1 26 (9 T) 4 mm. P_2 ± 22 (7—8 T) 3 mm. P_3 10—12; 2,5 mm. Disk 2,5 mm.

The specimens are habitually more slender and provided with more spiny distal pinnules than in *C. parvula*. A comb only occurs on P_1 and P_2. The genital glands are well developed in Sp. 1. Though *C. gracilipes* is rather closely related to *C. parvula*, it can, however, scarcely turn out to be a young form of this species. For, in the first place, Sp. 1 of *C. gracilipes* described above is mature, secondly in this specimen Cd still hides more of the I Br-series than in *C. parvula* (If the first-mentioned species were a young form one might expect the opposite conditions). In other respects the above-described specimens of *C. gracilipes* agree with A. H. Clark's short diagnosis.

Commissia ignota var minuta n. var.

Fig. 18—20. Photo 3.

From St. 42 (1 sp.), 45 (9), 45 A (1), 47 (5), 55 (11), 61 (2) = 29 specimens.

Sp. 1 (St. 45) Cd 1,5 mm. Free dorsal part 1 mm. C. XV 10; 3,5 mm. 2d segment hour-glass-shaped L = $1^1/_2 \times$ the distal br, 3d segment L = 3 × br, 4th L = 2 × br, 5th L = $1^3/_4 \times$ br, 6th and 7th segment

L = 1 1/3 br. Antepenultimate segment L = or somewhat larger than br; last 3 to 4 segments with a small, dorsal spine. Terminal claw strongly bent, somewhat longer than the preceding segment.

R—s appearing as small corner-flaps. I Br 1 h = 1/6 × br, laterally free, the angle between them about 45°. United with the axillary by syzygy. I Br 2 triangular h = 1/2 × br, with very concave distal sides. Br 1 and 2 rather narrow, h = 1/4 × br, on the outer side twice as broad. Arms X, ± 20 mm. The arm-bases fairly smooth. Syzygies, for instance, 3 + 4 . . . 11 + 12 . . . 15 + 16 . . distally with an interval of 3 oblique articulations. The longer side of the distal segments L = 2 × br. 20 Br-segments pr cm. (15, if the syzygial pairs are counted as units). The br of the segments 0,5 mm.

P_1—P_2 with a comb. Teeth 8—10. P_1 27; 4 mm., P_2 23; 3,5 mm. P_3 11; 2,5 mm. with a genital gland. Distal p. 14; 4,5 mm. 2d to 4th pinnulars somewhat notched on the outer side (especially on P_1 and P_2). The bases of the p—s however smooth because of connecting skin.

Disk smooth, ± 2 mm. Mouth central. Cushion-formed swellings along the ambulacral furrows. Anal funnel broad, coarse, short.

Sp. 2 (St. 45) P_3—P_{12} with genital glands. For further details of these as well as the following specimens see the table.

Sp. 3 (St. 45) P_2 very small. Disk 2 mm.

Sp. 4 (St. 45) I Br 1 h = 1/5 × br. P_3—P_9 with genital glands.

Sp. 5 (St. 45) Disk 3 mm. *Sp. 6* (St. 45) Disk 3 mm. Specimens 6—10 young, more slender individuals.

Sp. 7 (St. 45) Antepenultimate cirral in the smallest cirri L = 1 1/2 × br. I Br 1 bent outwards almost at a right angle. Disk 2,5 mm.

Sp. 8 (St. 45) Segments somewhat more spiny than in the preceding specimens.

Sp. 9 (St. 45) —. *Sp. 10* (St. 45) I Br 1 h = 1/4 × br. Disk 2 mm.

Sp. 11 (St. 42) 1 Br 1 almost completely hidden. P_1 with 23 segments. Disk thrown off. Basal star visible.

Sp. 12 (St. 47) Cd 2 mm., free dorsal pole 1,5 mm. IV C. very small. I Br 1 h = 1/8 br. Usually Br 1 + 2, 3 + 4; P_1 with 24, P_2 with 20 segments. The bases of the pinnules with strong genital swellings. Disk 3 mm. Colour brown.

Comissia ignota var. minuta.

Number of Specimens and Stations	Cirri			Arms		1 Br 2 h : br	P_1		P_2		P_3		Dist. p.	
	N	S	L	N	L		T	L	T	L	S	L	S	L
Sp. 1 St. 45	XV	10	3,5 mm.	X	± 20	1 : 2	8—10	4	8—10	3,5	11	2,5	14	4,5
Sp. 2 St. 45	XVI	10	3,5 »	X	± 30	—	8—10	—	8—10	—	—	—	—	—
Sp. 3 St. 45	XIX	9—10	2,5—3 »	X	15	—	T	—	T	—	—	—	—	—
Sp. 4 St. 45	XVI	9	3.5 »	X	20	—	T	—	T	—	—	—	—	—
Sp. 5 St. 45	XIV	10	3,5 »	X	—	—	8—10	—	8—10	—	—	—	—	—
Sp. 6 St. 45	XVI	10—12	3,4-4,5 »	X	—	—	T	—	T	—	—	—	—	
Sp. 7 St. 45	XVII	8—9	2—3 »	X	25	—	T	—	T	—	—	—	—	
Sp. 8 St. 45	XIII	9—10	2—3 »	X	25	—	T	3,5	T	2	—	—	12	3,5
Sp. 9 St. 45	XVI	8—9	—	X	20	—	7	—	T	—			—	—
Sp. 10 St. 45	XV	9—10	3 »	X	± 20	2 : 3	8	—	T	—	—	—	—	—
Sp. 11 St. 42	XVI	10—12	4 »	X	± 20	1 : 2	8	4	T	—	—	—	13	3
Sp. 12 St. 47	XX	10—11	4 »	X	30	1 : 5	9	4	9	3,5	11	3	14—15	3,5
Sp. 13 St. 47	XX	8—9	2—3 »	X	27	1 : 3	T	—	T	—	9	3,5	13	
Sp. 14 St. 47	XIX	9—10	3—4 »	X	25	1 : 3	8	4	7	3,5	12	3	12	
Sp. 15 St. 47	XIII	9—10	2—3 »	X	± 20	1 : 2	8	—	T	—	—	—	—	—
Sp. 16 St. 47	XIV	9—10	2,5—3 »	X	—	1 : 2	8	—	T	—	10	2	—	
Sp. 17 St. 55	XIX	10	3 »	X	25	—	8	—	8	—	—	—	12	—
Sp. 18 St. 55	XIX	9—10	3—4 »	X	30	1 : 3	T	—	T	—	—	—	—	—
Sp. 19 St. 55	XV	8—9	3 »	X	18	1 : 3	T	—	T	—	—	—	—	—
Sp. 20 St. 55	—	—	—	X	22	—	T	—	T	—	—	—	10	—
Sp. 21 St. 55	—	—	—	X	14	—	T	—	T	—	—	—	—	—
Sp. 22 St. 55	XVI	8	2 »	X	18	—	T	—	T	—	—	—	-	
Sp. 23 St. 55	—	—	—	X	—	—	T	—	(T)	—	—	—	—	—
Sp. 24 St. 55	XV	9	3 »	X	18	1 : 3	T	—	T	—	—	—	—	—
Sp. 25 St. 55	XVI	9	1,5 2,5 »	X	12	1 : 2	T	—	—	—	—	—	—	—
Sp. 26 St. 55	XIX	10	3 »	X	—	—	T	—	T	—	—	—	—	—
Sp. 27 St. 55	XIX	9	2,5 »	X	± 15	1 : 3	9	—	(T)	—	—	—	—	—
Sp. 28 St. 61	XIII	10	3 »	X	15	1 : 3	8	—	—	—	—	—	12	3
Sp. 29 St. 61	XII	8—9	2-2,5 »	X	12	2 : 3	8	—	—	—	—	—	—	—

Catoptometra magnifica minor Sp. 5—8.

Number of Specimens and Stations	Cirri			Arms		1 Br 2 h : br	P_1			P_2			P_3		Dist. p.	
	N	S	L	N	L		S	T	L	S	T	L	S	L	S	L
Sp. 5 (St. 47)	XXI	10—13	3—7	X	35	1 : 1	—	—	—	18	—	4,5	—	—	18	5,5
Sp. 6 (St. 47)	XXIII	11—13	3—4,5	XI	28	1 : 1	—	—	3	—	—	3	—	—	14	4,5
Sp. 7 (St. 47)	XIX	11—14	5—8	X	35	2 : 3	± 20	—	3,5—4	16—19	—	3,5—5	16	4	—	—
Sp. 8 (St. 61)	XXV	11—14	4—8	XI	45	2 : 3	—	—	4	—	—	5	—	—	18	6,5

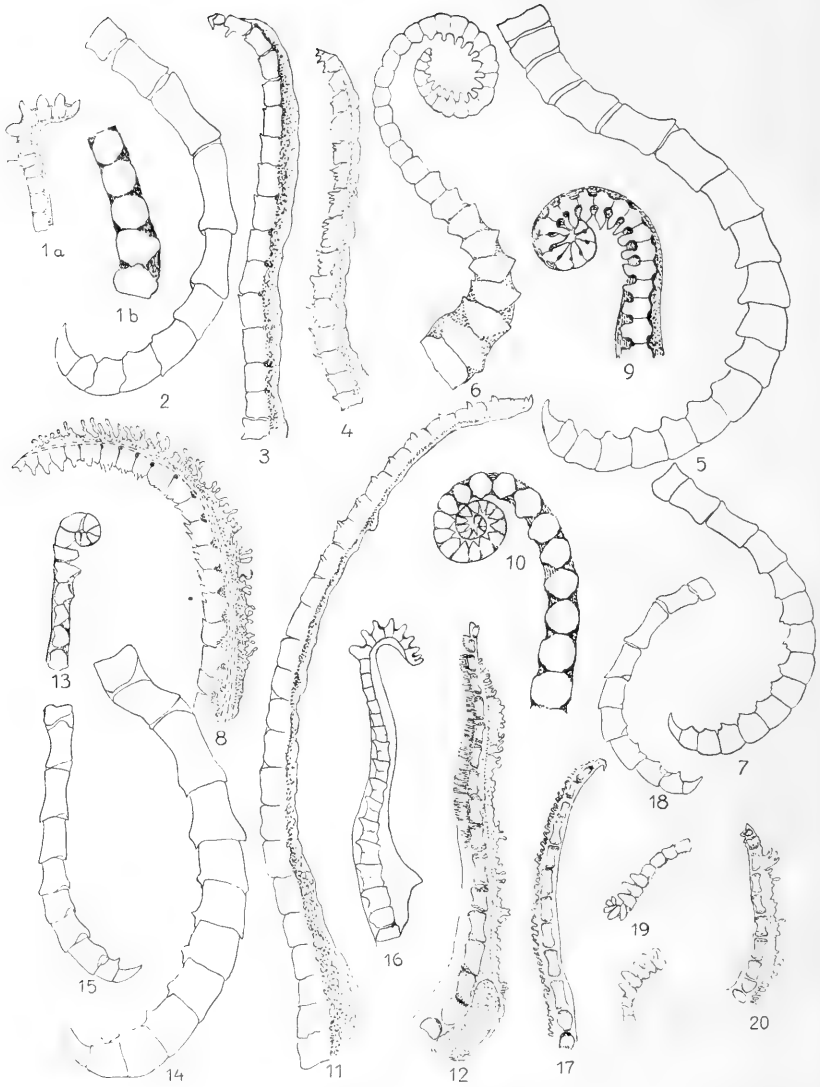

Fig. 1—3. *Comatella brachycirra* (St. 56 Sp. 1) 1 a) The comb on the distal part of P_1, × 17 1/2, 1 b) The proximal part of P_1, × 17 1/2, 2) A cirrus 14/1, 3) A distal pinnule 14/1; Fig. 4—6 *Comatella maculata* (St. 59), 4) Distal pinnule 14/1, 5) Cirrus 9/1, 6) P_1 with the comb, × 17 1/2; 7—9 *Comatella stelligera* (St. 59), 7) Cirrus 9/1, 8) Distal pinnule 14/1, 9) The tip of P_1 (17 T.), × 17 1/2; 10—11 *Comissia peregrina magnifica* (St. 59 Sp. 1) 10) The tip of P_1 14/1, 11) Distal pinnule 14/1; 12—14 *Comissia parvula* (St. 37 Sp. 1) 12) Distal pinnule with a small genital gland 14/1, 13) The tip of P_1, × 17 1/2, 14) Cirrus 14/1; 15—17 *Comissia gracilipes* (St. 35 Sp. 1) 15) Cirrus 14/1, 16) P_1 14/1, 17) A distal pinnule 14/1; 18—20 *Comissia ignota minuta* (St. 55) 18) Cirrus 14/1, 19) The tip of P_1 × 17 1/2, 20) Distal pinnule 14/1.

Sp. 13 (St. 47) I Br 1 as in the preceding specimen.

Sp. 14 (St. 47) I Br 1 h = $^1/_8$ br; Br 1 and 2 each h = $^1/_4 \times$ br. P_1 with about 25, P_2 with 20 segments. This and the two following specimens young individuals with gonads only slightly prominent.

Sp. 15 and *16* (St. 47) I Br 1 h = $^1/_3$ br. Cd 1,8 mm.

Sp. 17 (St. 55) With genital glands well developed like both the following specimens.

Sp. 18 and *19* (St. 55) I Br 1 almost completely hidden.

Sp. 20 (St. 55). Fixed on a worm-tube. *Sp. 21* and *22* (St. 55) Pinnules a little swollen by genital glands.

Sp. 23 (St. 55) P_2 sometimes lacking. *Sp. 24* (St. 55) R—s somewhat visible. I Br 1 h = $^1/_6 \times$ br.

Sp. 25 (St. 55) R—s narrow bands. I Br 1 h = $^1/_6 \times$ br. 3d cirral the longest L = 3 $^1/_2$ br. Antipenultimate cirral L = 1 $^1/_3 \times$ br. P_2 lacking.

Sp. 26 (St. 55) Pinnules genitally swollen. *Sp. 27* (St. 55) Antipenultimate cirral L = 1 $^1/_3 \times$ br. I Br 1 h = $^1/_6 \times$ br.

Sp. 28 (St. 61) R—s concealed. I Br 1 h = $^1/_4$ br. Syzygies with an interval of 3 oblique articulations. P_2 inconspicuous or lacking.

Sp. 29 (St. 61) I Br 1 h = $^1/_2 \times$ br. P_2—P_4 lacking.

As is evident from the comparison given above, the number of cirri varies between XII and XX (usually XV—XVI) and the number of cirrals between 8 and 12 (usually 9—10). The specimens seem to be mature at an arm-length of 25—30 mm., as in such specimens the pinnules are strongly swollen, but even with shorter arms the genital gland is quite visible. All specimens with complete pinnulation have combs on P_1 and P_2 but no teeth on P_3. The number of teeth varies between 7—10 and is usually 8. — It is interesting to observe the relation between the length and breadth of the most proximal Br-segments. The smallest specimens (e. g. Sp. 25 and 29) have the R—s plainly visible. I Br 1 is rather long in minor specimens (h = $^1/_2$ — $^1/_3 \times$ br), but becomes more and more short during growth (in full-grown specimens the h is = $^1/_6$ — $^1/_8 \times$ br or the ossicle is almost completely hidden by Cd). The length of the axillary also usually decreases (from L = $^2/_3$ to $^1/_5 \times$ br) but is never hidden by Cd.

The specimens approach *C. ignota*, from which they differ by having, on an average, more cirri, by some differences in the conditions of length of the cirrals, by smaller size etc.

Finally a few words about the relation between the genera *Comatella* and *Comissia*. When A. H. CLARK in 1909 proposed these two genera he characterized the first-mentioned one (Smiths. Misc. Coll. Vol. 52 p. 207) thus, that species belonging to this genus should have the first syzygy between Br 3 and 4 in arms situated on I Brax, but the first syzygy between Br 1 and 2 in arms coming from axillaries of higher numbers. According to CLARK's view some arms should therefore be divided by »extraneous» some others by »intraneous division» and thus one might in this genus have crinoids with so-called »compound arms». In the later proposed species *Comatella decora* CLARK has found a syzygy between Br 2 + 3 or on the outer side of the arm-divisions between Br 3 + 4. *Comatella brachycirra* MIHI usually, but far from always, has Br 1 + 2 on the inner side, 3 + 4 on the outer side of the arm-divisions. The specimens of *C. maculata* and *C. stelligera* that I have investigated usually have Br 1—2 3—+ 4, in the case both of the inner and outer side of the division-series; in a few cases, however, we find Br 1 + 2. — Most often, therefore, the »compound» nature of the arms is visible, but by no means always. From what is mentioned above it is evident that the compound nature never appears in X-armed young *Comatellas*. How are then the latter to be distinguished from the genus *Comissia*, the species of which always have X arms? As to this A. H. CLARK in the Siboga Exp. Vol. 42 B, p. 23 has remarked that the young of *Comissia* can be distinguished from the X-armed young of other genera by very short and broad I Br-series, the ossicles of which are said to be united in very close articulation. As I have tried to show in describing *Comissia ignota minuta* this only holds good in full-grown specimens of the species. The small young of large *Comissia*-species might therefore have rather long I Br-segments and are consequently similar to young *Comatellas*. Just as the immanent tendency to »compound arm-division» did not appear in X-armed young *Comatellas* it cannot, if it exists, assert itself in *Comissia*-species which never reach beyond the X-armed stage. In reality, therefore, the difference between the genera turns out to be a difference between a group of X-armed and a series of multibrachiate forms of *Capillasterinæ*. Joint characteristics by which both the genera are distinguished from other genera within the subfamily are as follows: P_1 on Br 2, short Br-segments, complete pinnulation, cirri of normal comasterid type, at

least P_1 and P_2 with a comb, proximal pinnulars never with strong prominences. — Whether the limit between the genera *Comatella* and *Comissia* is a natural one I must leave an open question.

This seems to be the place to mention a young Comasterid swept from a depth of 400 fathoms in Sagami Bay (St. 37). If this young specimen described below belongs to any previously known *Comasterid* species there are only a few of which one might expect that it may be a young form, for the number of Comasterids found at a depth of more than 150 fathoms is only about 10. Since the proximal segments are rather high and narrow and the arm-bases widely separated, one can eliminate both the above-described *Comissia*-species (which are deep-water forms); of the remaining ones it approaches closest to *Comatulides decameros*, known from great depths off Japanese coasts. There is, however, in the young specimen an important difference from this species: there are dorsal spines on the cirrals. It is however, rather likely that the absence of dorsal spines is not a primary feature in *Comactiniinæ*. Under such circumstances it is possible that dorsal spines can appear in the young specimens and then again disappear. The formation of the cirrals in the other *Comatulides*-species (*C. australis*) perhaps also points in this direction; A. H. Clark remarks that: »the last 4 or 5 segments before the penultimate have their distal dorsal margin very slightly thickened.» Description as follows:

C. XIX 11—14; 5—6 mm. The 4th segment longest L = 2 1/2 × br. 3d and 5th somewhat shorter. From the 7th segment a weak dorsal prominence. Terminal claw curved, pointed, somewhat longer than the preceding segment.

R—s h = 1/5 br, at the middle hidden by Cd. I Br 1 h = 1/3 × br, laterally free, united with I Br 2 by synarthry. This ossicle low pentagonal, h = 1/2 br. Br 1 free inside, like the following ossicle on the inner side somewhat narrower. Br 1 and 2 united by a close articulation. All the segments after Br 4 somewhat hour-glass-shaped, distally bent outwards and spiny. Arms X, 35 mm., proximal parts rather narrow, well separated from each other. Syzygies 3 + 4 . . 11 + 12 . . 15 + 16 etc. with an interval of 3 oblique articulations. Segments distally somewhat longer than broad.

P_1 25. 5 mm. with 8—10 T, the tip smooth. P_2 and P_3 with combs. P_3 8 T. P_4 11; 3 mm. without a comb. P_7 14; 4,2 mm. Distal p. ± 15; 5 mm. Basal segments short, spiny, the distal ones longer (L = 1 1/2 br).

Disk 5 mm., swollen, somewhat cushion-formed, without granules; clearly visible from the dorsal side in the broad interspaces between the arms, reaching to Br 4. Mouth and arms subcentral. Anal funnel 2,5 mm.

Subfam. **Comasterinæ** A. H. CLARK.

Comaster (L. AGASSIZ) A. H. CLARK.

Comaster delicata var grandis n. var.

Fig. 26—29. Photo 4.

From St. 45 (3 sp.), 51 (1), 59 (1), 60 (1) = 6 specimens.

Sp. 1 (St. 51) Cd thickly discoidal, 10 mm., free dorsal pole 5 mm., flat with somewhat raised margins.

C. XLII 27—28 (D) 30—32 (V) 35—40 mm. in 2 to 3 whorls. 1st and 2d segment shorter than long, 3d and 4th cubical, 5th—9th somewhat longer than broad to L = 1 1/2 × br. Dorsal spine from the 11th segment (Length of this segment = br). From about the 15th segment L = 1/2 × br. Dorsal spines and opposing spine very small, h = 1/6 × the breadth of the segment. Terminal claw L = 1 1/4 × preceding segment.

I Br 1 almost completely hidden by Cd. I Brax pentagonal h = 1/2 br, distal margins weakly concave. The disk visible in the narrow interspaces between the outer sides of the II Br:s and I Brax. II Br:s are 4 (3 + 4). II Br 1 and 2 with distinct synarthrial tubercle. Primipostaxillaries completely grown together inside. From II Br 2 the distal margins of the segments are somewhat collar-shaped, bent outwards and provided with small spines. III Br:s are 2 (1—2) in 8 cases of 13. IV Br:s: 4 (in all 13 cases). Arms XLVI 130 mm. Br 1—7 discoidal, then oblique joints. Syzygies for instance: 3 + 4 . . 12 + 13 . . . . 17 + 18 etc. with an interval of 4 to 5 oblique articulations. The

height of the segments = $^1/_2 - ^1/_3 \times$ br. 13—14 segments pr cm. (11, if the syzygial pairs are counted as units). The breadth of the arms proximally 3—3,5 mm. In the middle arm-parts 2 mm.

$P_{II} \pm 40$ (6—8 T) 14—17 mm., P_{IV} 32 (5—6 T) 10 mm., P_1 and P_2 decreasing, P_3 about 20 (5 T) 5 mm. This, however, not always so decided, but P_2 or P_3 are most often the shortest. In the posterior arms the pinnules are genitally swollen after P_{IV}. Combs to $P_{20} - P_{25}$, most often on every two p., here and there even to P_{30}. The basal segments of the pinnules distally somewhat bent outwards and bordered with spines. Genital p. 7 mm. Distal p. 20—25; 9 mm. Dorsal hooks on the last 9—12 segments.

Disk smooth, without calcareous granules or papillæ, 25 mm. Anal funnel central, short, verruciform, L = 4 mm. Colour yellow-brown. Cirri whitish with brown transverse bands.

In the pinnules and arms an ento-parasitic new myzostomid, compare *Protomyzostomum*.

Sp. 2 (St. 45) The free dorsal surface of Cd 4 mm. C. XXVII 23—25 (D) 25—27 (V), 25—30 mm. in 2 whorls.

R—s appearing in the corners. I Br 1 h = $^1/_4 \times$ br, united by synarthry with I Brax. Laterally of half their height fused with each other. Disk somewhat more visible in the interspace between the arms than in the preceding specimen. I Brax flattened pentagonal, h = $^2/_3 \times$ br. Primipostaxillaries united inside for the most part. II Br:s are 4 (3 + 4) 9 cases, III Br:s : 2, 13 cases, IV Br:s : 4, 3 cases. Synarthrial tubercle between II and III Br 1—2. Arms XXXV + (probably XXXIX in the complete specimen) 125 mm. Arm-bases in this and the following specimen smoother than in the preceding one. The breadth of the arms proximally 2,2 mm., in the middle of the arm 1,7 mm.

$P_{II} \pm 40$ (7 T) 16 mm. $P_{IV} \pm 38$ (7 T) 15 mm., $P_1 \pm 25$ (6 T) 5 mm. P_2 18; 3 mm. Then longer p. again; combs here and there at least to P_{25}. Distal p. 18; 7 mm.

Disk 18 mm. Anal interradius large, swollen, with calcareous papillæ. Colour grey-yellow.

Sp. 3 (St. 45) C. XX 19—20 (D), 26—27 (V), 12—25 mm. II Br:s are 4 (9 cases), III Br:s : 2, IV Br:s : 2, V Br:s : 2 (1 case). Arms XLVII 105 mm.

P_{II} 24—37 (6—7 T) 11—13 mm., P_1 20—35; 5—9 mm., P_2 and P_3 very short (4—6 mm). Combs here and there to P_{25} or P_{30}. Distal p. 16—18; 6 mm.

Disk 14 mm. Anal interradius with coarse and large calcareous plates.

In this specimen there is a fine example of »multiplicative» arm-regeneration. Instead of the usual method of arm-division in this genus with an undivided arm now on the right now on the left from a II Brax, we have in this case a type of arm-division that continually gives unramified arms to the inner side, but which on the outer side continues to ramify.

I 1+2 { II 1–2 3+4 { III$_1$ 1–2 { IV$_1$ 1–2 { Br$_1$ 1–2 3+4...11+12... / Br$_1$ 1–2 3+4...10+11... } / Br$_1$ 1–2 3+4...11+12... } / III$_1$ 1–2 { Br$_1$ 1–2 3+4...11+12... / IV$_1$ 1–2 { Br$_1$ 1–2 3+4... / V$_1$ 1–2 { Br$_1$ 1–2....10+11... / Br$_1$ 1–2 3–4...11–12.. } } } } / II 1–2 3+4 { III 1–2 { Br 1–2 3+4....11+12.. / Br 1–2 3+4....10–11.. } / III 1–2 { Br 1–2 3–4....11–12... / Br 1–2 3+4....12+13..17+18..22+23...

Sp. 4 (St. 60) Cd 4 mm. free dorsal surface 1,5 mm. C. XXII 20—21 (D) 26—30 (V) 13—26 mm. i 2 whorls. 4th segment a little longer than broad, 5th to 7th or 8th one L = 1 1/2 × br, then shorter again. From the 7th or 8th segment polished segments with transverse cristas with small spines. Opposing spine h = 1/4 × the br of the segment.

R—s visible in the corners. I Br 1 h = 1/3 br, laterally free from each other. I Brax pentagonal h = 1/2 × br. Lateral margins form an obtuse angle with I Br 1. Distal borders with small spines as in the following ossicle; for the rest the arm-bases are rather smooth.

Primipostaxillaries united inside. II Br:s are 4, III Br:s : 2 (in 4 cases) Arms XX 90 mm. Syzygies as in Sp. 1. 14 segments pr cm. (11, if the syzygial pairs are counted as units). Breadth of the segments 1,2 mm.

P_{II} 35 (8 T) 10 mm.; P_1 31 (6 T) 9,5 mm., P_2—P_4 4—3,5 mm., decreasing, with 5 T and 15—20 segments. A short comb here and there to P_{25}; the interspaces are, however, very large after P_{15}. Distal p. 17; 6,5 mm.

Disk 11 mm., finely papillous. Anal funnel central. Colour yellow-red. A *Protomyzostomum* incysted.

Resembles *Comantheria grandicalyx* var. Sp. 1 in general appearance.

Sp. 5 (St. 45) Cd covered with small cavities, 2,5 mm., free dorsal pole 1,5 mm. C. XVII 15—20; 10—19 mm. 6th to 8th segments the longest ones. L = $1\,^1/_2 \times$ br; 9th segment a transition segment. Opposing spine h = $^1/_3$ — $^1/_4 \times$ br of the segment.

I Br 1 h = $^1/_4 \times$ br, laterally free from each other, a weak synarthrial tubercle with I Br 2. II Br:s are 4 (3 + 4). Arms XIII 65 mm. Syzygies with an interval of 3 to 4 oblique articulations.

P_1 25 (6—7 T). P_2 5 T; 5,5—9 mm. P_3 and P_4 4 T; 4,5 mm. P_1—P_5 with small, spiny, dorsal processes on the 2d to 5th segment. A comb here and there to P_{15}.

Disk 9 mm. Anal interradius with large calcareous papillæ. Mouth marginal. Colour (in spirit) white.

Sp. 6 (St. 59). C. XXIV 11—15; (4)—10 mm. 3d segment L = $1\,^1/_2 \times$ br. 4th and 5th L = 2 × br. 6th or 7th a transition segment. Dorsal spine very indistinct. Opposing spine h = $^1/_4 \times$ the br of the segment.

R—s nearly hidden by Cd. I Br 1 h = $^1/_3 \times$ br, laterally almost free. Axillary h = $^1/_2 \times$ br, its lateral sides bent sidewards at an angle to I Br 1. Primipostaxillaries united inside. II Br:s are 4, III Br:s : 4 (in one case on an inner arm). Arms XXI 55 mm. Syzygies as in the preceding specimen. Distal segments L = $1\,^1/_2 \times$ br, narrow, almost smooth, somewhat overlapping distally.

P_{II} ± 30 (7—8 T) mm. P_1 ± 30 (7 T) 7 mm. or shorter. P_2 21 (7 T) 4 mm. P_3 18 (5 T) 3,7 mm. P_6 21 (6 T) 4,5 mm. Spiny processes on the proximal segments. Combs with 5—6 T here and there at least to P_{13}. Distal p. 16—17; 5,5 mm. The last two segments with dorsal hooks.

Disk 7,5 mm., papillous. Mouth marginal. Anus central.

To this species one might also assign a very young specimen from St. 44, described among the young ones (see below).

An examination of the occurrence of the combs gives the following result:

Sp. 1 On an arm situated on III Brax: P_1 P_2 P_3 P_4 P_5 P_6 P_8 P_{10} P_{11} P_{15} P_{17} (P_{18-19} are lacking) P_{21} P_{23} P_{25} P_{27} (After P_{30} no comb).

The same arm on the other side P_1—P_6 P_8 P_{10} P_{12} P_{14} P_{16} P_{17} P_{19} then usually more sparse.

Sp. 2 On an arm situated on III Brax P_1—P_5 P_7 P_9 P_{11} P_{13} P_{15} P_{17} P_{18} P_{20} P_{22} P_{24}.

Sp. 3 » » » » » » » P_1—P_4 P_6 (P_8 broken) P_{10} P_{12} P_{13} . . . P_{19} P_{21} (P_{20-30} broken) P_{31}.

Sp. 4 » » » » » I Brax P_{II} P_1—P_5 P_7 P_9 P_{14} P_{20}.

Sp. 6 » » » » » » P_{II} P_1 (P_2 and P_3 usually very small, sometimes without a comb) P_4 P_6 (P_{7-11} broken) P_{14}.

Other arms of this specimen show that more than 6—8 p. on each side of the arm do not occur.

Example from sp. juv. *St. 44:* P_1 (P_2 . P_4 are lacking), no more combs. —

This species is most closely related to *C. delicata* but differs by having larger dimensions and more cirri and cirrals, as well as by the abundant occurrence of 4 IV Br:s.

Comaster serrata A. H. Clark.

Fig. 21—25.

Syn.: *Comatula serrata* 1907 A. H. Clark Proc. U. S. Nat. Mus. Vol. 33, p. 154.

Comaster serrata 1908 A. H. Clark Proc. U. S. Nat. Mus. Vol. 33, p. 686; 1912 Crin. Ind. Oc. p. 89; 1915 Journ. Acad. Sci. Vol. 5, p. 214; 1918 Siboga Exp. 42 B, p. 37.

Comaster parvicirra 1908 A. H. Clark Proc. U. S. Nat. Mus. Vol. 34, p. 306.

From St. 45 (1 sp.) 55 (1), 59 (1) = 3 specimens.

Sp. 1 (St. 59) Cd 2,2 mm., free dorsal pole 1 mm. C. XVII, 10—11; 5—7 mm. in a single or double whorl; 1st segment short, 2d strongly hour-glass-shaped L = 1 1/2 × br; 3d L = 3 × br, 4th somewhat shorter L = 2 1/2 × br. 5th segment a transition segment. Dorsal spine small, indistinct, on the distal part of the segment. Penultimate segment L = br with opposing spine; h of this one about = 1/5 × the br of the segment. Terminal claw L = ± 2 × the preceding segment, strongly curved.

R—s concealed. I Br 1 h = 1/4 × br, partly hidden by Cd. I Brax h = 1/3 × br, almost triangular. A syzygy between I Br 1 and 2. All the way from I Brax the margins of the segments are distally bent outwards and very spiny. II Br:s are 4, III Br:s 2 (1 + 2). Arms XXVIII 50—70 mm. Br: 1 + 2 except when the arm originates from a I Brax; then occurs Br 1—2 3 + 4. Br 1—7 discoidal, then oblique joints. 16 segments pr cm. (12 if the syzygial pairs are counted as units). The breadth of the arms 0,7 mm. Segments distally: L = 1 1/2 × br, slender, hour-glass-chaped.

I 1 + 2 { Br 1—2 3 + 4 5
II 1 - 2 3 + 4 { III 1 + 2 { Br 1 + 2 3 4 5 . . .
Br 1 + 2 3 4 5 . . .
III 1 + 2 { Br 1 + 2 3 4 5 . . .
Br 1 + 2 3 4 5 . . . 10 + 11 . . 14 + 15 . . 18 + 19.

P_{II} and P_1 25—30 (6 T) 6 mm., 11—13 first segments with very spiny distal collars, $P_2 \pm 23$; 5 mm. (The 7 most proximal segments spiny), $P_3 \pm 20$; 3 mm., $P_4 \pm 15$ (5 T), 2,5 mm. P_1—P_4 or P_5 with combs, then on every two or three pinnules to about P_{20}. The teeth of the combs: h = 1 1/2 × the br of the segments. Distal p. 20; 6,5 mm. the segments (except the most proximal): L = 2 × br, at the ends knotty swollen and spiny.

Mouth central. Anal funnel lateral, papillated. Disk smooth without granules, 6 mm. Colour brownish.

Sp. 2 (St. 55) C. XIV, 9—10, 4—6 mm. 3d and 4th segments L = 3 × br.

R—s narrow bands. I Br:s 1 laterally free, h = 1/3 br. I Brax h = 1/2 br, pentagonal. Primipostaxillaries united inside. II Br:s are 4 (3 cases); III br:s : 2 (2 cases). The arms are XV 45 mm. Syzygies with an interval of 3 oblique articulations.

P_1—P_4 with combs; afterwards here and there but scarcely farther than to P_{10}. Example P_1 P_2 P_3 P_4 P_6 P_9. P_1 with 5, P_2 with 4 T.

Mouth subcentral. Anal funnel large, papillated, swollen, 1,5 mm. Disk 3 mm., dark brown. Colour for the rest light grey-brown.

Sp. 3 (St. 45) C. XVI 8—9; 2—3 mm. 3d and 4th segment L = 3 × br.

I Br 1 laterally free, h = 1/3 br. Axillary h = 1/2 × br. Primipostaxillaries free inside. II Br:s are 4, III Br:s : 2. Arms XIII 25 mm. Br-segments strongly bent outwards and serrate. Syzygies as before. (After III Brax 1 + 2 3 4 5 . .). Length of the distal segments = 1 1/2 — 2 × br.

P_1—P_3 or P_4 with short, high combs of 4—5 T. $P_1 \pm 25$; 2,5—3 mm. No distal pinnules with combs. Distal p. 12—14; 4—5 mm.

Disk 2,5 mm., a little cushion-shaped. Mouth central. Anal funnel short, coarse, smooth, length 0,8 mm., breadth about the same.

See for the rest the description of the young forms from Bonin Island (p. 58), some of which certainly belong to this species.

As in the preceding species, *the young forms* of this one *seem to lack combs on distal pinnules.* The finest example of this is *Sp. 3* of *Comaster serrata.* The specimen in question is a connecting link between the X-armed young forms (it has like these only a couple of proximal pinnules provided with combs) and the full-grown specimens

(in conformity to which it has the III Br series with following Br 1+2 developed and is therefore certainly determinable). — The combs occur more and more abundantly on larger specimens and, finally, in full-grown specimens reach far out on the distal parts of the arms. Usually a comb occurs on every second pinnule. — The late ontogenetical occurrence of combs on distal pinnules probably has a correspondence in the phylogenetical evolution and might stand in a certain relation to an altered manner of living and a different mode of catching the food, a question that I shall discuss in another connection.

Comantheria A. H. Clark.

C. grandicalyx (P. H. Carp)

Fig. 30, 31.

Syn.: *Actinometra grandicalyx* 1882 P. H. Carpenter Journ. Linn. Soc. Vol. 16, p. 520.

Comantheria grandicalyx 1912 A. H. Clark Crin. Ind. Oc. p. 90; Smithson. Misc. Coll. Vol. 60, N:o 10, p. 7; 1915 Journ. Acad. Sci. Vol. 5, p. 214; 1918 Siboga Exp. Vol. 42 B, p. 43.

From St. 52: 2 specimens.

Sp. 1 Cd 10 mm. in diameter, the dorsal surface very concave, free dorsal pole 6 mm.

C. ± LXXV 26 (D) 25 mm., 30—31 (V) 29—34 mm., in about 3 close whorls. 1st to 5th segments shorter than long to cubical. 6th to 11th or 14th a little longer than broad, the following segments decreasing, L = $^2/_3$ — $^1/_2$ × br. From the 20th or 25th segment a very weak and indistinct dorsal spine. Opposing spine a little stronger. Terminal claw rather coarse, somewhat longer than the penultimate segment.

I Br 1 almost concealed. I Brax low pentagonal L = $^1/_3$ × br, the distal margins concave. II Br 1 basally united in pairs inside. III Br 1 and 2 and sometimes also Br 1 and 2 fused in pairs on the inner side. II Br:s : 4 (3 + 4), III Br:s : 2 (1—2, a weak synarthrial tubercle), IV Br:s : 4 (3 + 4). The components of the division series smooth, broad,

tolerably flat. Disk only appearing slightly between the inner sides of the II Br series. Arms LVIII 120 mm. Syzygies for instance 3 + 4 . . 16 + 17 . . 22 + 23 . ., distally with an interval of 4 oblique articulations. 16 segments pr cm. (13 if the syzygial pairs are counted as units). The breadth of the arms at the middle 2,2 mm. Br segments very short, L = 1/3 — 1/4 × br.

P_{II} ± 60; 30 mm., about 20 T (37th to 58th segment) the tip smooth; the teeth rather thin, low, h = 1/2 of the br of the segments. P_{IV} or P_1 22—28 mm., ± 20 T. P_2 ± 15 mm. with about 15 T. P_3 6 T, 11 mm. If P_{IV} is lacking only 4 pinnules (P_{II}—P_3) with teeth, P_6 9,5 mm. Genital p. 14 mm. Distal p. 25; 11 mm., the 3 last segments with small dorsal hooks. The proximal pinnules have the first 5—12 segments provided with small prominences; the notches between these partly filled up by skin.

Disk 40 mm. Mouth marginal. Anal funnel central, sharply set off from the anal interradius, L = 14 mm. No calcareous granules or papillæ in the skin. Colour brown; a somewhat lighter middle-line on the dorsal side of the arm. On about 10 of the posterior arms 25—30 pairs of pinnules are without ambulacral furrows. The ambulacral furrow of the arm, however, always remain.

Sp. 2 The dorsal free surface of Cd slightly concave, 9 mm. C ± LXX 27 (D) 30 (V) 25—30 mm.

II Br—s : 4 (3 + 4), III Br—s : 2 (20 cases), IV Br—s : 4 (3 + 4) 26 cases, V Br—s : 2 (2 cases). Arms LXVIII, 130 mm. or shorter. The formation of the arms as before.

P_{II} > 35 mm., > 80 segments. Teeth from the 40th or 55th to the 75th segment. Comb best developed about the 60th segment. P_{IV}—P_3 decreasing, with teeth. All the arms with ambulacral furrows.

Disk 42 mm. Anal funnel 17 mm.

Comantheria grandicalyx var. flagellipinna n. var.

Fig. 32.

From St. 51 (1 sp.), 62 (1) = 2 specimens.

Sp. 1 (St. 51) Cd 12 mm., free dorsal surface 9 mm., h = 3 mm. C. Ll, 28—33; 27—35 mm. in 2 or 3 whorls. 1st segment L = 1/2 × br 2d—11th cubical, a little thicker at the ends, 12th—14th somewhat longer than broad. About the 20th segment a transition-segment. Dorsal spine weak, but rather distinct. The spines on the distal cirrals pointed. Terminal claw curved, L = 1 1/2 × the penultimate segment.

I Brax h = 1/2 br, distally protracted at an acute angle. II Br 1 inside almost completely free. II Br—s : 4, III Br—s 2 (20 cases) IV Br—s 4 (24 cases). Arms LXIV 140—190 mm., dimorphous. Example of armdivision:

I 1—2
- II 1—2 3+4
  - III 1—2
    - IV 1—2 3+4 ...
      - Br 1—2 3+4 ...
      - Br 1—2 3+4 ...
    - Br 1—2 3+4 ...
  - III 1—2
    - Br 1—2 3+4 ...
    - IV 1—2 3+4 ...
      - Br 1—2 3+4 ...
      - Br 1—2 3+4 ...
- II 1—2 3+4
  - III 1—2
    - IV 1—2 3+4 ...
      - Br 1—2 3+4 ...
      - Br 1—2 3+4 ...
    - Br 1—2 3+4 ...
  - III 1—2
    - Br 1—2 3+4 ...
    - IV 1—2 3+4 ...
      - Br 1—2 3+4 ...
      - Br 1—2 3+4 ...

2d syzygy at the 22d—24th segment, 3d at 28th or 30th segment then with an interval of 4 (to 5) oblique articulations. 19—23 segments pr cm. (15—17, if the syzygial pairs are counted as units).

Breadth of the Br—s 50 mm. from the base of the arms 1,8 mm. Distally 0,6 mm. The joints very swollen, thick and coarse.

P_{II} 75—80; 30—33 mm. with a very indistinct comb, partly hidden by skin; ± 12 T, the tip of the pinnula smooth. P_{IV} ± 12 T similar to the preceding p. P_1 with 18 T, which are more strongly developed, ± 23 mm. P_2 ± 40 (6 T) 16 mm., the tip smooth. P_3 shorter with some few, small teeth, P_4 ± 25 (no T) 6 mm. Genital p. 12 mm. Basal segments as in the chief species. Distal p. ± 30; 14 mm, Length of the pinnulars = 1 1/2 × br. Dorsal hooks indistinct. Distal p. spirally rolled.

Disk 38 mm. Colour red-yellow.

Sp. 2 (St. 62) Cd 11 mm., free dorsal pole 7 mm. C ± L, 27—32; 24—29 mm. 13th—18th segment a transition segment.

II Br—s : 4, III Br—s : 2, IV Br—s : 4 (3+4), in one case 2; V Br—s 2 (one case). Arms LXVIII 90—110 mm. 19 segments pr cm.

P_{II} ± 65 (10—17 indistinct T) 32 mm., P_{IV} 28 mm. ± 55 (12 pinnules with small T), P_2 31 (8 T) 12 mm., P_3 25 (5 T) 8 mm., P_4 no T, 6 mm. Genital p. ± 20; 8,5 mm. Distal p. ± 25; 11 mm.

Disk 33 mm. Anal funnel 12 mm., somewhat swollen but well marked out from the disk. Mouth adradial, marginal. Colour brown-orange to grey-brown.

Both these specimens are distinguished from the chief species by the nearly smooth distichal pinnule, by very short Br-segments, by a more slender constitution and by the trifling size of the disk when compared with length of the arms. (The last-described specimen, however, somewhat approaches C. *grandicalyx*).

Comanthus A. H. Clark.

C. solaster A. H. Clark.

Fig. 33, 34.

Syn.: *Comatula solaster* 1908 A. H. Clark Proc. U. S. Nat. Mus. Vol. 33, p. 153.

Comanthus solaster 1909 A. H. Clark Videnskabl. Meddelelser Kobenhavn, p. 147; 1912 Crin. Ind. Oc., p. 94; 1915 Journal Acad. Sci. Vol. 5, p. 214; 1918 Siboga Exp. Vol. 42 B, p. 49.

From St. 20 (1 sp.), 28 (1) 38 (2) = 4 specimens.

Sp. 1 (St. 38) Cd 11 mm., free dorsal pole a little concave 7,5 mm. C ± LXX 18—23; 12—21 mm. in 2 or 3 whorls. Cirri very diversiform in appearance, often slender, straight, weak; sometimes of the usual type; coarse, thick and strongly curved (compare Fig. 34). The first-mentioned ones have the 1st segment short, 2d—3d or 4th cubical or a little longer. 5d—8th segment L = ± 2 × br (when the C are of the later type these segments have only L = 1 1/4 × br). From about the 10th segment L = 1/2 × br. Dorsal transverse ribbon or knot occurs from 12th or 16th segments. Terminal claw rather coarse, somewhat longer than the penultimate segment.

I Br 1 hidden by Cd. I Brax triangular h = 1/2 × br, distal angle very acute, separating II Br—s 1, which are only narrow tips inside. The other primipostaxillaries united inside. II Br—s : 4, III Br—s : 4, IV Br—s : 4. Arms L 110—130 mm. Division series smooth, very close. From the dorsal side only the bases of the distichal pinnules visible (the first 6 segments). Disk concealed in dorsal view. Syzygies : 3 + 4 . . 17 + 18 . . 23 + 24 or 3 + 4 . . 14 + 15 . . 18 + 19 etc. with an interval of 4 oblique articulations. Br 4 — ± Br 70 with distally overlapping, thickened segments with small spines, then smooth arms. 20—21 segments pr cm. (15—16 if the syzygial pairs are counted as units). II Br—s : br = 4 mm. Br 1 br = 2,3 mm.; 50 mm. from the arm-base the br is = 1,3 mm.

P_{II} ± 60; about 25 mm. with 8—16 weak teeth, 2 to 5 last pinnulars smooth, the basal segments angular, a little knotty. P_{III} similar somewhat shorter. P_{IV} or P_1 about 20 mm. (11 T). P_2 with 8 rudi-

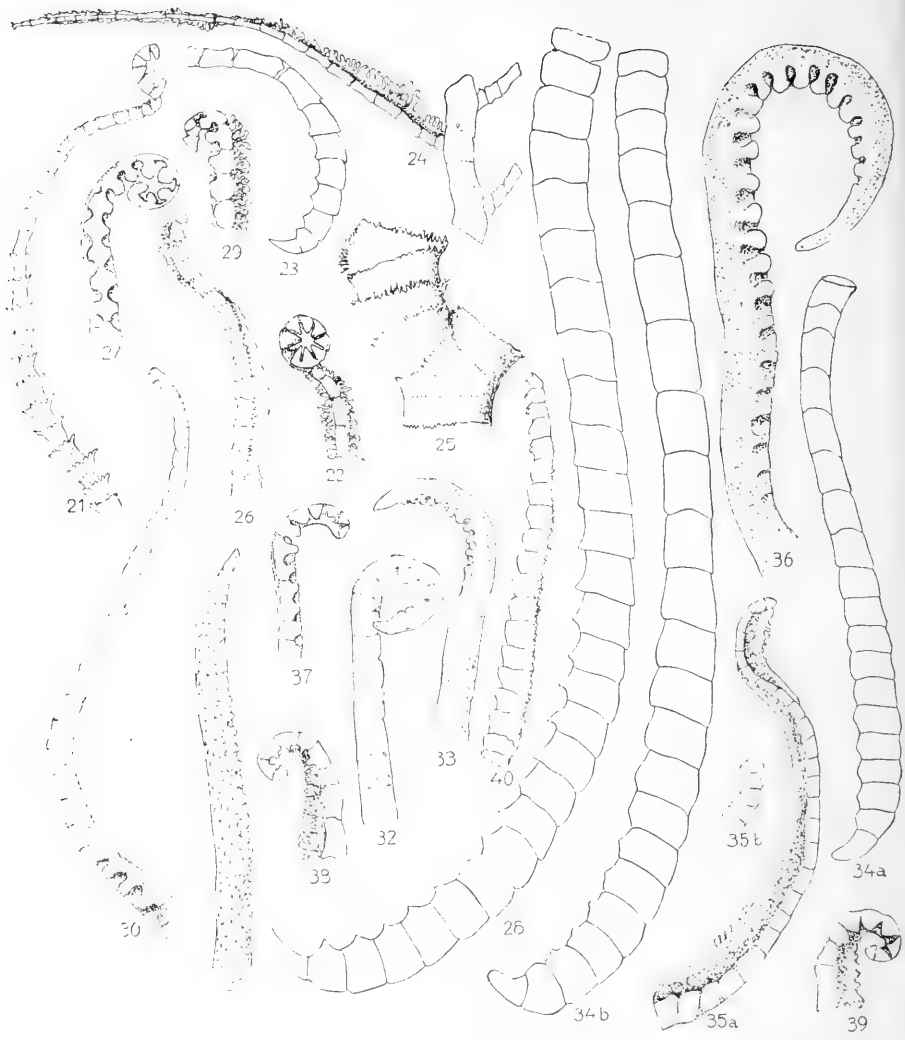

Fig. 21—25. *Comaster serrata* (St. 59) 21) P_{II} $^{11}/_{1}$, 22) The tip of P_{10} (9 T). × $17\,^{1}/_{2}$, 23) Cirrus $^{9}/_{1}$, 24) An arm-stump with distal p—s $^{14}/_{1}$, 25) The base of an arm with I and II Br series. The spines which occur at the distal margins of the segment are most often broken $^{14}/_{1}$; 26—29 *Comaster delicata grandis* (Sp. 1) 26) The tip of a distal pinnule $^{9}/_{1}$, 27) The tip of P_{II} $^{14}/_{1}$, 28) Cirrus $^{7}/_{1}$, 29) The tip of a genital p. with a comb. × $17\,^{1}/_{2}$; 30, 31 *Comantheria grandicalyx* (St. 52) 30) Distal pin-

mentary teeth, still shorter. P_3 6,5 mm. without a comb. Genital p. 11—12 mm. Distal p of about equal length. On all pinnules 2d—5th or 7th segments with small prominences.

Disk 30 mm., without granules. Mouth admarginal. Anal funnel subcentral, 7 mm.

Sp. 2. (St. 38 A). Cd 10 mm. dorsal pole a little concave, 6,5 mm. C. LXV 22–24; 12—25 mm.

I Br 1 h = 1/10 × br. I Brax h = 1/2 br. II, III and IV Br—s : 4 (the last-mentioned division-series appearing in 2 cases). Arms XLII 125—155 mm.

Disk 32 mm. Anal funnel 8 mm. Colour as in the preceding specimen violet-brown. Cirri and regenerated parts somewhat lighter.— A splendid specimen.

Sp. 3 (St. 28) Cd 10 mm., free dorsal pole 7 mm. C. LV 20—26; 12–22 mm.

I Br 1 slightly visible. Axillary almost triangular h = 2/3 × br. II and III Br—s : 4. Arms XL 105—125 mm. Sutures between the distichal and palmar segments slightly visible, division-series not quite so smooth as in Sp. 1.

P_{II} ± 55 (10—12 T) 24—25 mm. T indistinct, h about 1/3 of the br of the segment. P_{III} to P_2 shorter; also P_3 with a small comb. Genital p. 10 mm. Distal p. 11—12 mm. — Disk 32 mm. Anal funnel 6 mm.

Sp. 4 (St. 20) Cd 10 mm., dorsal pole 8 mm. C. ± LX 20—24. 14—23 mm. in 2 whorls. A great many empty joint-cavities.

II and III Br—s : 4. Arms XL 105—120 mm. Division series and arms as in Sp. 1.

P_{II} ± 50; 28 mm. P_{III} with 6—8 very low T.; 5 to 6 top-segments smooth; ± 20 mm., P_1—P_3 decreasing (P_2 ± 10 mm., P_3 7 mm. without a comb.) Distal. p. 9 mm. — Disk 28 mm. Anal funnel 6 mm.

nule 9/1. 31) The tip of P_{II} 9/1; 32 *Comantheria grandicalyx flagellipinna* (St. 54) 32) The tip of P_{II} 9/1; 33, 34 *Comanthus solaster* 33) The tip of P_{II} 9/1, 34 a) Dwarf cirrus b) Cirrus of the larger type 9/1; 35, 36 *Comanthus pinguis* (St. 58) 35) Distal pinnule (observe the dimpled perisome; common to all larger comasterids) b) The tip of the pinnule in lateral view to show the slight dorsal hooks (observe stout cirri) 9/1. 36) The tip of P_{II} 9/1; 37—40 *Comanthus annulata* (St. 42) 37) The tip of P_{II}, × 17 1/2, 38) The tip of P_7 viewed from the inside, showing slight teeth-like swellings which constitute ridges supporting the teeth on the outside of the pinnule, × 17 1/2. 39) The same pinnule viewed from the outside with 7 stout teeth, × 17 1/2, 40) Distal pinnule with stout dorsal hooks (observe small cirri) 9/1.

In all these specimens one finds the variable appearance of the cirri peculiar to *C. solaster*. The only difference from the specimens described by A. H. Clark is the number of C, which in the Bockian species are more numerous and arranged in 2 to 3 whorls. The above-described specimens might perhaps therefore be characterized as a forma *multicirra*.

Comanthus pinguis A. H. Clark.

Fig. 35, 36.

Syn: *Comanthus pinguis* 1919 A. H. Clark Proc. U. S. Nat. Mus. Vol. 37, p. 29; 1912 Crin. Ind. Oc. p. 94; Smiths. Misc. Coll. Vol. 60, N:o 10, p. 9; 1915 Monograph; Journ. Acad. Sci. Vol. 5, p. 214; 1918 Siboga Exp. Vol. 42 B, p. 49.

From St. 14 (2 sp.), 15 (1) [18 (1)] = 4 specimens.

Sp. 1 (St. 14) Cd almost hemispherical, 9 mm., free dorsal pole 5 mm., a little hollowed in the middle. C. XXXVIII 28—33; 30—36 mm. in 2 whorls. 1st and 2d segments short, 3d to 5th cubical or somewhat longer., 6th—10th segment L = 1 1/2 br. Distal ones L = 1/2 × br. Dorsal prominences from the 15th to 20th segments, L = ± 1/5 of the br of the cirral. A weak opposing spine. Terminal claw slightly curved. L = 1 1/2 × the preceding segment.

R—s slightly visible at the corners. I Br 1 h = 1/4 br, in the basal half united with each other. Between them a depression in the perisome. I Brax h = 1/3 × br, pentagonal, the distal margins slightly concave. The br 6,5—7 mm. Primipostaxillaries united inside. On their distal, interdistichal side a depression as between the primibrachial series. Divisions-series broad, smooth, flattened, but the perisome between them is quite visible. The distance between II Br 3 in two different division-series is 3,5 mm. Disk reaching to II Br 2 or 3. II and III Br—s: 4 (3 + 4). Arms XXXVIII 125 mm. +, very fragile. Br-segments distally somewhat, but only slightly, thickened. Syzygies distally with an interval of 4 oblique articulations. Example of arm-ramification and proximal syzygies:

$$
-2\begin{cases}
\text{III } 1\text{—}2\ 3+4\begin{cases}\text{III } 1\text{—}2\ 3+4\begin{cases}\text{Br } 1\text{—}2\ 3+4\ldots 7+8\ldots 21+22\ldots 26+27\ldots\\ \text{Br } 1\text{—}2\ 3+4\ldots 6+7\ldots 18+19\ldots 24+25\ldots\end{cases}\\ \text{III } 1\text{—}2\ 3+4\begin{cases}\text{Br } 1\text{—}2\ 3+4\ldots 8+9\ldots 19+20\ldots 25+26\ldots\\ \text{Br } 1\text{—}2\ 3+4\ldots\ldots\ldots 19+20\ldots 24+25\ldots\end{cases}\end{cases}\\
\text{III } 1\text{—}2\ 3+4\begin{cases}\text{III } 1\text{—}2\ 3+4\begin{cases}\text{Br } 1\text{—}2\ 3+4\ldots\ldots\ldots 16+17\ldots 21+22\ldots\\ \text{Br } 1\text{—}2\ 3+4\ldots\ldots\ldots 18+19\end{cases}\\ \text{III } 1\text{—}2\ 3+4\begin{cases}\text{Br } 1\text{—}2\ 3+4\ldots\ldots\ldots 14+15\\ \text{Br } 1\text{—}2\ 3+4\ldots\ldots\ldots 15+16\end{cases}\end{cases}
\end{cases}
$$

16 segments pr cm. (13, if the syzygial pairs are counted as units).

P_{II} 50—55; 30 mm., last 5 segments smooth. T 20 low, thin, h = ± 1/4 of the br the pinnular, P_{III} 45, last 6 segments smooth, 15 T. ± 25 mm. P_1 45 (15 T) 22 mm. (last 5 segments smooth), P_2 8 T, 10 mm., P_3 6 T, 8 mm. (h of T = 1/2—1/3 of the br of the segment. One or two distal segments without teeth), P_4 and P_5 usually with a rudimentary comb. Distal p. ± 25; 10 mm. 3d to 5th pinnular with skin connecting the knots as in *Comantheria grandicalyx*, most distinct on proximal p.

Disk 32 mm. without granules. Mouth adradial. Anal cone 6 mm. Colour: dorsally light yellow, ventrally yellow-red with a sharp colour-border, especially on the lateral sides of the division-series.

Sp. 2. (St. 14) Cd 9 mm., free dorsal pole rather flat, 6 mm., h = 2 mm. C. XXXIV 28—31; 30—38 mm.

Arms XXXVIII 140 mm. The components of the division-series a little thickened in the articulations and therefore the arm-bases are not quite as smooth as in. Sp. 1.

P_{II} ± 50 (16 T) 35—42 mm. P_{III} 12 T, 5 to 6 top-segments, as usual, smooth, 30 mm. P_1 13 T (3 top-segments smooth), ± 25 mm. P_2 8 T, P_3 6 T., 7 mm. P_4 and P_5 still a little shorter also with combs. P_6 longer without a comb.

Disk 32 mm. Anal funnel 5 mm. Colour as in Sp. 1. Disk, however, spotted with olive-brown.

Sp. 3. (St. 15) Cd 8 mm., free dorsal pole 5 mm. C. XXXII 23—28, 18—25 mm. Dorsal spines a little stronger than in the preceding specimen.

I Br 2 h = 1/3 br, the distal angle somewhat prolonged, br =6 mm. Arms XXXII 115 mm. The interspaces between II Br 3 : 2,5 mm. The arm-branches somewhat more slender than in the preceding specimens.

P_{II} + 45 (5 to 14 T., the tip smooth) 26—33 mm. P_{III} or P_1 (+ 10 T) 23 mm. P_2 8—9 T, 18 mm.; P_3—P_5 with a small, short comb (3—5 T); P_6 without a comb 18; 5,5 mm.

Disk 28 mm. Anal cone 4,5 mm. Colour a little more grey-brown than in the foregoing specimens.

One may possibly also assign a young Comasterid (St. 18) to this species.

Sp. 4 ? (St. 18) C. XIII 10—12; 2,5—3 mm. 3d—5th segment longest L = 1 1/2 × br.

R—s h = 1/3 × br. I Br 1 h = 1/2 × br, latterally free. I Brax h = 2/3 × br, pentagonal, the distal margins straight. Br 1 inside almost free. Arms X, 7 mm. 1st syzygy between Br 3 and 4. The segments distally collar-shaped, spiny, and overlapping.

P_1 with an indistinct comb, the tip is smooth, the pinnule rolled. T 7 low, sparse, obtuse. P_2—P_4 to P_5 are lacking.

Disk 2,3 mm. Mouth and anus subcentral. Anal cone 1 mm. Disk rather »lean», weakly papillated.

A comparison with specimens in Dr Mortensen's collection from Japan showed that it is only the very largest specimens of *C. pinguis* that have the ossicles of the division-series so broad that they grow together laterally. The division-series are, however, always (even when not in lateral contact) strikingly broad and flat. *C. japonica*, according to the scheme in the Siboga volume, has narrow division-series, leaving broad parts of the perisome unprotected. Nevertheless A. H. Clark says about the original specimen (Leyden Mus. Vol. 33, p. 181) that »the division-series are rather broad». The formation of I Brax seems to be a charac-teristic of species more certain than this one. While *C. pinguis* has an axillary that in old specimens gets almost straight distal margins, these in *C. japonica* are very concave, and therefore the distal angle of the axillary becomes very prolonged (As also in *C. solaster*).

Comanthus (Vania) annulata (Bell).

Fig. 37—40.

Syn: See 1918 A. H. Clark Siboga Exp. Vol. 42 B, p. 53.

From St. 42 A = 1 specimen.

Sp. 1 Cd flattened, 4 mm. Dorsal pole 3 mm. C. XV 15; 9—10 mm. in a single whorl. 1st and 2d segment shorter than long, 3d segment cubical, 4th and the following ones longer, a little hour-glass-shaped, 6th segment the longest, L = 1 1/2 × br. From 7th or 8th segment a weak and indistinct dorsal prominence. The L of distal segments = 2/3 × br. The cirrus in the distal part somewhat pressed together and in lateral view somewhat thickened. The terminal claw short, coarse, a little longer than the penultimate segment. Cirri weak, small.

R—s somewhat projecting at the corners. I Br 1 laterally fused with each other, distally broader, h = 1/5 × br. I Brax low pentagonal, h = 1/3 × br, laterally united as usually also II Br : s 1. Primipostaxillaries fused inside. Bases of the arms smooth. The branches of the arms close together. Syzygies 3 + 4, 11 + 12, 16 + 17 etc. with an interval of 4 oblique articulations. Br 1—7 discoidal, then oblique joints. II Br—s : 4 (3 + 4), III Br—s : (3 + 4). Arms XL 80 – 120 mm. dimorphous. Distal segments slightly thickened at the distal ends. 14 Br-segments pr. cm. (11, if the syzygial pairs are counted as units). The br. of the arms proximally 2,5 mm., distally 1 mm. or less.

P_{II} ± 50 (6—8 T) 16—18 mm., P_{III} 45 (5—6 T) 12 mm., P_1 ± 35 (7 T) 10 mm. P_2 ± 20 (7 T) 6 mm., sometimes without a comb, P_3 with or without a comb. Teeth then on every second or third pinnule to P_{11}. Distal p. ± 20; 8 mm. (1st and 2d segments short, the rest longer than broad, the last 4 to 5 segments with dorsal hooks). The bases of the p. rather smooth.

Disk 20 mm. Anal funnel central. Mouth interradial. Colour (in spirit) grey-brown. The shorter, posterior arms coarser, their p. often without ambulacral furrow.

Comanthus (Vania) parvicirra (J. MÜLLER).

Syn.: See 1918 A. H. CLARK Siboga Exp. Vol. 42 B, p. 54.

C. parvicirra *α* **comasteripinna** n. subsp.

Fig. 41—43.

Syn.: *Comaster multifida* and *typica* 1919 T. GISLÉN K. V. A:s handl. Bd. 59, N:o 4. p. 14 and 9.

From St. 40 (1), 49 (broken arms), 63 (1) = 2 specimens +.

Sp. 1 (St. 40) Cd 3 mm., only sligthly raised above the dorsal surface. C. IX 13—15; 4—7 mm., in a single, incomplete whorl. 1st segment short, 2d and 3d about cubical, 6th longest L = $1\,^1/_2 \times$ br. From the 7th segment a weak dorsal prominence. Opposing spine h = $^1/_5$ of the br of the segment. Terminal claw curved, L = $1\,^1/_2 \times$ penultimate segment.

R—s h = $^1/_6$ br. I Br. 1 h = $^1/_4$ br, laterally united. I Brax h = $^1/_3$ br, laterally free, low pentagonal. Primipostaxillaries united inside. II Br—s 4 (9 cases), 2 (1 case), III Br—s 4 (4 cases). Arms XXIV 90 mm. Division-series smooth. The basal arm-segments somewhat »chubby,» then slightly overlapping and with small spines distally. The br. of the arms proximally 1,8 mm. Syzygies 3 + 4 (sometimes 4 + 5 or still later) . . 11 + 12 . . etc. with an interval of 4 oblique articulations. 14—15 segments pr cm. (11. if the syzygial pairs are counted as units).

P_{II} + 45 (9—10 T) 12 mm. P_1 8—11 T; 10 mm.; P_2 8—9 T, 20—25; 5—7 mm. P_2 or P_3 shortest, the latter with 15 segments (8—9 T) 4—5 mm. Combs on about every second p to P_{25} or P_{30}. Example P_4 P_5 P_7 P_9 P_{11} P_{13} P_{15} P_{17} etc. Distal combs with about 10 T. Distal p. 22—28; 10 mm.

Disk 15 mm., without granules, hemispherically swollen. Anal funnel central, 3 mm. Colour: dark sepia. Disk in dorsal view somewhat visible between the arms, not reaching farther than to III Brax.

St. 49 (Broken arms) Arms 100—140 mm. The proximal parts of the arms br = 2,2 mm. Syzygies as before 16 (resp 13) segments pr cm.

Combs with 8—10 T at leasto P_8 or P_{10}.

To this species there also belongs very probably a young specimen from Sagami which shows a great resemblance to larger individuals in Dr Mortensen's collection from the same locality referable to *C. parvicirra*. Description as follows:

Sp. 2 (St. 63) Cd 1,9 mm. free dorsal part 1,6 mm. C. lacking. Pits of XVII in a single whorl.

R—s narrow, at the middle almost concealed bands. I Br 1 h = 1/3 br, laterally free. I Brax h = 1/2 × br, pentagonal, br = 1,3 mm. Disk visible in the interspaces (br = 0,5 mm.) between the arms. II Br—s : 4 (4 cases). Arms XIV 20 mm. Primipostaxillaries united inside basally. II Br 1 h = 1/5 br. II Br 2 and Br 2 distally and dorsolaterally broader. Syzygies 3 + 4 . . 10 + 11 etc. with an interval of 3 to 4 oblique articulations. Arm-segments after Br 4 distally bent outwards and a little small-spiny 20 (resp. 16) segments pr cm.

P_1 with 8—10 large T., tip not smooth. P_2 similar, somewhat shorter, 3 mm., P_3 12, ± 3 mm., basally a little swollen (by a gonad?) — Basal pinnulars weakly carinate. Distal p 12—14, 3,5 m. coarse, short segments, distally dorsal hooks (cf. fig.)

Disk 5 mm. Anus central. Colour yellow-brown. The last mentioned specimen most probably referable to the 3d subspecies (*γ. vanipinna* represented in Dr. Mortensen's collection from Sagami; otherwise cf. p. 52).

Comanthus (Vania) parvicirra β comanthipinna n. subsp.

Fig. 44, 45.

From St. 40 — 1 specimen.

Sp. 1 Cd 3 mm. C. VII 13—14; 8—9 mm. coarser and more curved than in the preceding sub-species.

B—s projecting IR. II Br—s : 4 (4 cases), 2 (6 cases), III Br—s : 4 (2 cases). Arms XXII 105 mm., most of them loose, broken. Syzygies with an interval of 4 oblique articulations. 12—13 segments pr cm (10, if the syzygial pairs are counted as units). Breadth of the arms 2,3 mm.

P_{II} + 40; 13 mm. with a comb as in typical *Comanthus-Cenolia*-species, that is in this case + 12 low, thin teeth which on both sides

(proximally and distally on the pinnule) obliterate. The tip of the p. with 2 or 3 smooth segments. $P_1 \pm 12$ mm. P_2 5,5 mm. P_3 and the following ones without a comb. Distal p. 27; 11 mm. The segments: L — 1 1/2 × br, the 4 outermost ones with distal hooks.

Disk thrown off. The pinnules of some arms without ambulacral furrows.

Both these newly proposed sub-species of the polyform *C. parvicirra* differ in many characteristics from each other. Thus for instance *β* has coarser arm-bases and somewhat fewer Br-segments pr cm. but it is chiefly the different appearance of the comb that has caused me to separate these two types and to denote them by different names.

Within the sub-fam. *Comasterinæ* of the fam. *Comasteridæ* one can distinguish chiefly 3 different types of combs. The first of these, which I should like to call the *Comaster*-type, is characterized by a short, strongly rolled comb, with some few, large and close teeth. The combs occur on every second or third p. to rather far out on the arm. The second, the *Comanthus*-type, has combs with a greater number of teeth, which are small and low, and therefore thinly placed. They become smaller proximally and distally and obliterate towards the tip of the pinnule, leaving the latter smooth. The combs occur on a very few proximal pinnules (never farther than P_6) and in an unbroken series, that is never on every second or third p. as in type 1. The 3d type — to a certain extent an intermediate one — is the *Vania*-type, which has rather high and large teeth right out to the tip of the pinnule. Combs occur as in type 2 in an unbroken series.

Both the first-mentioned types are usually very regularly associated with certain genera within the above-mentioned sub-family *Comasterinæ*. Type 1 is found in the genus *Comaster*, type 2 is, as far as I have been able to verify, characteristic of the genera *Comantheria*, *Comanthina* (?), and *Comanthus (Cenolia)*. In the genus *Comanthus (Vania)* the use of this characteristic, like so very many others, becomes, however, impossible in the diagnosis. To *Comanthus-Vania* are assigned two species distinguished from each other by such an artificial character as the number of arms. The facts of the matter are undoubtedly, however, that *Comanthus (Vania) annulata* represents *one* group of forms

with a generally greater number of arms which are longer and coarser, *C. (Vania) parvicirra another* one with a smaller number of more slender arms. Nevertheless, both the »species» vary so considerably that they often intrude upon each other's spheres.

The specimens obtained by the Bockian expedition, show that within the subgenus *Vania* there occur types of combs of both the *Comaster*-, *Comanthus*- and (of this I have been convinced by observations on Dr Mortensen's Japanese specimens of this species) of the *Vania* type too. In revising the Bockian collection I have distinguished type 1 and 2 in *C. (Vania) parvicirra* by ranging them in two different sub-species. I have been neither able nor willing to discuss the innumerable synonyms of this species — A. H. Clark has given an imposing synonym list in Siboga Exp. Vol. 42 B. It is not possible to distribute the names of this list among the 2 new sub-species because most of the authors have given no information about the occurrence and appearance of the combs. Even A. H. Clark, who has described hundreds of specimens belonging to this species, has hardly given any other information except about cirri and division-series. It is therefore natural that he has escaped making the observation that a comb of the *Comaster*-type also occurs in the sub-genus *Vania*. Already in my work upon the crinoids of Dr Mjöberg's expedition I recorded the statement of P. H. Carpenter about the occurrence of the *Comaster*-type in 3 of the species referred by A. H. Clark to the *parvicirra*-group, viz. *Actinometra elongata, simplex* and *quadrata*. All the Mjöbergian specimens, however, had 4 components in the II Br-series and the *Comaster*-type in respect of the distribution of pinnules, and consequently, trusting to the Clarkian genus-diagnosis, I referred the abovementioned species, most suitably referable to *Vania parvicirra*, to the genus *Comaster* and assigned the specimens with coarser cirri to *C. multifida* and those with rudimentary cirri to *C. typica*. Since then I have had an opportunity to establish that the occurrence of combs far out on the arms is not exclusive to the genus *Comaster* but is also found in the genus *Comanthus* subgenus *Vania*.

It is not curious that both these species of the subgenus. *Vania* have caused great trouble to all authors by their extreme variability in practically all distinguishing characteristics otherwise succesfully used. Not only are cirri and cirrals, division-series and Br-segments

very variable in appearance and number; to this is added, as mentioned above, the varying development and distribution of the pinnule-combs. In *Vania annulata* the combs in the above-described specimen reached as far as P_{11}. In a specimen from Java of the same form-series (still not described; possibly, however, belonging to a new species on account of the very long, slender and well-separated arms) the combs occurr on every second pinnule and reached at least P_{35}. As to *Vania parvicirra* I refer to the descriptions given above.

A. H. Clark in a letter to me writes about both these species as follows: »The species of *Comasterinæ* are the most difficult of all Crinoids — I may even say of all the Echinoderms — to determine. The two species which I call *parvicirra* and *annulata* are very likely arbitrary divisions of one type; but it is convenient to call the smaller individual with 30 or fewer arms *parvicirra* and the larger with 30—70 arms[1] *annulata*. Many specimens of the latter with the III Br series 2 are practically indistinguishable from certain species of *Comantheria* . .»

According to this division *Comaster typica* Sp. 2 Mihi 1919 would be assigned to *Vania annulata*. Nevertheless it corresponds closely with the other specimens in the Mjöbergian collection and has also unusually short arms and therefore I should be disposed to include it in *Vania parvicirra*.

As to the reason of the polyformity of this subgenus I will only point to the following:

It is possible that the two species of *Vania* have become a rubbish heap for divers species difficult of solution or types inconvenient for the systematist. In such a case it would be possible to put order into the now confusing multitude and to get a survey over the existing types by a detailed description of specimens. Characteristics that might perhaps be applied would be the number, presence or absence of cirri, the br of the arm-bases, the appearance and formation of the Br-segments, of the division series, of the proximal (and also distal) pinnules and pinnulars, of the disk and eventually of calcareous spicules, that is to say the inclusion of all characteristics and then an examination of a large material.

[1] According to the Siboga work 35—60 arms.

Further it may be that these possibly existing small species partly make hybrids between themselves and perhaps partly also form crossings with proximal species in the genera *Comaster*, *Comantheria* and *Comanthus*. If these hybrids are fertile they will after a couple of generations be split into countless different types. Supposing, for instance, that a form without cirri, with III and IV Br-s : 4, and with a *Comanthus*-comb (restricted to proximal pinnules) were crossed with a form with cirri, with III and IV Br-s : 2, and with *Comaster*-comb (that is short, high combs dispersed to distal pinnules). Further, supposing that such a hybrid were fertile and therefore in the 2:d generation was normally split in the different possibilities of combination. Then one would get forms that might be referred to all the genera known within the sub-fam. *Comasterinæ*. (If, e. g., the first 3 gens as heterozygotic might be represented with different forms: rudimentary cirri, mixture of 2 and 4 components in the III and IV division-series, one would get 108 different possibilities). The great variability in the division-series even in the same specimen seems to be a proof of the probability of the heterozygotical nature of certain specimens of *C. parvicirra*.

In a special paper I will treat a 3:d possible influencing cause, viz. alteration in the mode of catching food.

Though in many cases the *Comasterids* show primitive characteristics such as clumsy formation, frequently (in the genus *Comaster*) a primitive way of arm-division, a number of components in the division-series that is very indefinite, it is evident that in other characteristics the family is in fast development and has entered quite a specific direction of evolution. A lot of the characteristics which are engaged in such a development have this apparently caused by the changed manner of catching food and are treated in connection with this question.

The variability of the cirri is probably caused by another factor and their regression, which is observable in different species of the *Comasterid* family, I suppose to be caused by the dorsal hooks on the distal pinnules having taken over the anchoring function that otherwise falls upon the cirri. These dorsal hooks are to be found in most of the *Comatulids*, though usually visible only by strong magni-

fication. In the *Comasterids* they are large and well developed, they appear smallest in species with powerful cirri as in *Comanthus pinguis*. Everyone who has worked somewhat with species of this genera, knows that for instance a *Comaster* or *Vania parvicirra* has a strong power of attaching itself by means of the dorsal hooks of the distal pinnules. Consequently the cirri will become superfluous or perhaps even be a hindrance if the animal wishes to creep about, which by the observations of H. L. Clark is proved to be the manner of locomotion of some *Comasterids*. Because of this they become reduced and in many genera they have totally obliterated (as in species of *Capillaster, Comatula, Comaster, Comantheria, Comanthina* and *Vania*).

As appears from the above investigation the subgenus *Vania* is a very critical genus, forming to a certain extent a middle link between *Comantheria-Comanthus* and *Comaster*. The reason why I have not united all these genera is that I perceive the possibility of *Vania* representing a rallying group of hybrids and hybrid-splittings with combinations of characteristics from different form-circles. I should have liked to put *Vania* as a separate genus between *Comaster* and *Comantheria-Comanthus*. In this case I would have distinguished it from the the first-mentioned genus by the III Br—s chiefly consisting of 4 components, from the two latter ones by comb-provided pinnules often occurring far out on the arms. Nevertheless the characterizing in such a case is not satisfactory, if one does not transfer all the *Vanias* of *comanthipinna*-type to the genus *Comanthus (Cenolia)*. Perhaps therefore, it is for the present quite as good to keep the classification made by A. H. Clark and put *Vania* as a sub-genus under *Comanthus*. Still it is then to be observed that, according to his scheme of examination, *V. parvicirra a comasteripinna* ought to be referred to *Comanthus* if one pays attention to the division-series, to *Comaster* if one takes into consideration the occurrence of the combs. Compare also in this connection the above quoted statement of A. H. Clark. Another solution, and this a rather good one, might be possible. This would be to subdivide *Comasterinæ* into 2 genera: *Comaster* and *Comanthus*, the first one characterized by comb-provided pinnules occuring distally on every second or third pinnule, the latter one with comb-provided pinnules in an unbroken series. With such a division the

two types would also be easy to keep apart if it were a question of systematically proximal forms, for, as is shown above, such forms are to be found, no matter how the division is made. On the same specimens the combs seldom or never vary in occurrence on different arms and so to this extent they offer a better distinguishing feature than the division-series. The sub-division proposed above is still, however, impossible to carry out because of the incompleteness of the preceding species-descriptions in the statements as to the appearance and occurrence of combs. So much, however, can be said, that to the first mentioned genus might be referred the genus *Comaster* sensu A. H. Clark, *Vania* (pro parte) and eventually *Comanthina* (and *Comantheria*) pro parte. To *Comanthus* sensu nova should be referred *Comantheria*, *Comanthina* (p.p.), *Comanthus* (*Cenolia*) and *Vania* p.p.

Young Comasterids from the Bonin Islands:
From St. 44 (1), 45 (15), 47 (6), 50 (1), 53 (1), 54 (1), 61 (1) = 26 specimens.

Comatella sp.

Sp. 1 (St. 53) C. XI 8—9; 2—2,5 mm. 3d segment L = 2 1/2 × br. Terminal claw curved, longer than the penultimate segment.

B—s projecting between the R—s as small corners. R—s narrow bands. I Br 1 h = 1/3 × br. Arms X, ± 15 mm. Syzygies with an interval of 3 oblique articulations. The segments somewhat folded outwards and spiny.

P_1 with a comb of 5—6 T. P_2 and P_3 absent.

Disk smooth, dark-brown. Mouth central. Anal funnel small, not papillated.

Comatella sp. juv. or the young forms of a large *Comissia* sp.

Sp. 1 (St. 45) C. XIX 14—16; 6—8 mm. 4th segment the longest, L = 2 1/2 × br. Dorsal spine from the 4th segment. — R-s narrow bands. I Br 1 h = 1/4 br, laterally free. Axillary h = 1/2 × br, forms with the preceding segment a low synartrial tubercle. Br 2 on the outer side

twice as broad. Arms X, 45 mm. Syzygies with an interval of 3 oblique articulations. Distal segments L = 1 1/2 × br, weakly spiny, but not bent outwards. — P_1 and P_2 with a comb; P_3 usually, P_4 always absent. P_1 25—30 (10 T), 5,5 mm. strongly rolled at the tip. — Mouth subcentral. Anal cone, small, marginal. Disk 4 mm.

Probably a young form of *Comissia peregrina magnifica* like both the following ones.

Sp. 2 (St. 45) C. XIII 12—14; 4—5 mm. 3d and 4th segment L = 2 × br. Arms X, 25 mm. P_1 and P_2 with a comb. P_4 and usually P_3 absent. P_1 with 9 T. Mouth central. Disk 2,5 mm.

Sp. 3 (St. 45) C. XII 10—11; 2,5 mm. Arms X, 15 mm. P_1 with a comb, then a gap to Br 11 or 13. Mouth central. Disk 2,5 mm.

Sp. 4 (St. 47) C. XVII 12—15; 6—7 mm. 3d and 4th segment L = 1 1/2 — 2 × br.

I Br 1 h = 1/3 br, laterally free. Axillary h = 2/3 br, pentagonal. Br 1 h = 1/4 br, Br 2 h = 1/3 br. Arms X, 30 mm. Arm-bases smooth. Syzygies as in Sp. 1 (St. 45). P_1 — P_3 with a comb (P_1 ± 15 T., P_3 8—11 T), P_4 lacking. Distal p. 12—14; 3,5 mm. Strong dorsal hooks on the 3 last segments. Disk smooth, dark-brown, 3,5 mm. Mouth subcentral. Anal funnel short. (Disk half thrown off, under this a new regenerated one).

Sp. 5 (St. 47) C. XI 8—9; 2 mm. 3d segment the longest L = 3 × br. — I Br 1 h = 1/4 br. Axillary triangular with very concave distal margins forming an acute distale angle, h = 1/2 br. Br-segments spiny and bent outwards. Arms X, 10 mm. P_1 7 T, 2,5 mm. P_2 absent. P_3 without a comb.

Sp. 4 and 5 perhaps young *Comatella maculata* (or *stelligera*).

Sp. 6 (St. 61) C. XV 9—12; 2—3,5 mm. — R—s h = 1/4 br. I Br 1 h = 1/3 br. Axillary h = 1/2 br. Syzygies as in Sp. 1 (St. 45). Arms X, 20 mm. — P_1 with 9 sparse T. P_2—P_4 lacking. Mouth central. Disk 2 mm., dark-brown, pentagonal. Anal funnel small.

Young *Comaster serrata*, the two last ones probably *C. delicata grandis*.

Sp. 1 (St. 45) C. XIV 9; 2 mm. R—s h = 1/4 br. I Br 1 h 1/3 br. Arms X, 10 mm. Br- segments strongly serrate and bent outwards. P_1 (and P_2 if not absent) with a short high comb; P_3 and P_4 lacking. Mouth central. For the rest like Sp. 3 of *Comaster serrata*.

Sp. 2 (St. 47) C. XIII 9; 2,5—3 mm. 3d and 4th segments L = 2 1/2 × br.

Arms X, 15—20 mm. The arm-bases rather serrate. Between Br 1 and 2 a close synarthry. Syzygies with an interval of 3 oblique articulations. P_1 (and P_2 when present) with a short, high comb of 4—5 T. P_3 lacking. No distal pinnules with combs

Mouth central. Disk 1,2 mm. Anal funnel short, wart-shaped; the anal interradius with calcareous plates in the skin, but no papillæ.

Sp. 3 (St. 44) C. XIII 9—10; 3—4 mm. 3d—5th segments L = 2 × br. — R—s h = 1/7 br. I Br 1 h = 1/3 br, laterally free, articulating closely with the axillary, which is pentagonal h = 2/3 br. Br 1 basally united inside. Syzygies as in *Sp. 2* (St. 47) Arms X, 22 mm. Br-segments rather long, distally somewhat bent outwards and spiny. Proximal parts of the arms well separated. Disk reaching to Br 2. P_1 21 (5 large T) 2,5 mm. The height of the teeth = 1/3 × the br of pinnular. P_2, P_3 and sometimes P_4 absent. Pinnulars very spiny. Distal p. 14; 3 mm. (The 3d and following segments L = 4 × br). No combs on the distal p.

Disk 3 mm. Anal cone subcentral, swollen, papillated.

Young forms of *Comantheria* (doubtful whether sp. 2 belongs to this genus).

Sp. 1. (St. 45) C. XIV 11—17; 3—6,5 mm. 4th segment the longest, L = 1 1/3 — 1 1/2 × br. From the 7th segment a dorsal prominence fixed a little before the distal margin. Opposing spine h = 1/3 of the br of the segment, coarser and more pointed than the preceding ones. Cirri from the dorsal whorl considerably more tender.

R—s h = 1/7 br. I Br 1 h = 1/3 br, laterally free, a weak synarthrial tubercle with the axillary, which has the h = 1/2 br, with somewhat concave distal margins. Syzygies 3 + 4, 11 + 12, 16 + 17 etc. with an interval of 4 oblique articulations. Br:s 1 united inside to 2/3. Arms X, broken, 15 mm. +. The arm-bases tolerably smooth, after Br 7 with the distal margins a little bent outwards and spiny. Breadth of the arms proximally 0,6—0,8 mm.

P_1 27 (9—11 rather low, triangular T, h = 3/4 of the segment) 5,5 mm. P_2 6 T; 3 mm., P_3 rudimentary, P_4 without a comb 11; 1,5 mm.

Disk 4 mm. Anal tube chimney-shaped, 1,5 mm., subcentral The skin smooth, without papillæ. Mouth somewhat marginally displaced.

Sp. 2 (St. 45) C. XIX 9—12; 2—4,5 mm. — B—s visible in the corners. R—s h = 1/5 br. I Br 1 h = 1/2 br. Arms X, 25 mm, The distal borders of the axillaries spiny and bent outwards. Syzygies 3 + 4, 11 + 12, distally with an interval of usually 3 oblique articulations. Distal Br-segments L = 2 × br, strongly hour-glass-shaped and spiny.

$P_1 \pm 20$ (about 5 coarse T) 3 mm., P_2 absent, P_3 without a comb 7; 1,5 mm. Distal p. ±; 2,2 mm. — Disk 2,5 mm. Anal funnel 1 mm. Mouth somewhat dislocated.

A young form of *Vania*.

Sp. 1 (St. 50) C. XII 9; 2—3 mm. slender, in a single whorl 4th segment the longest L = 2 × br. Cd low, flattened. — R—s narrow bands h = 1/5 br. I Br 1 h = 1/2 br, laterally free. Axillary h = 2/3 br, pentagonal. Primipostaxillaries well separated inside. The synarthry between Br 1 and 2 usually rather similar to the syzygy between Br 3 and 4. Br 1 and 2 h = 1/3 br, the outside somewhat broader. Arms X, 12 mm. Br-segments serrate, only slightly overlapping. Syzygies with an interval of 3 oblique articulations, — $P_1 \pm 6$ T, P_2 and P_3 rudimentary or lacking. The following pinnules without a comb. Distal p. 2,5 mm. — Disk 2,5 mm., reaching to Br 1. Anal cone smooth, 1,2 mm., sharply set off with a papilla whorl round the opening. Mouth marginally displaced. Colour yellow-brown.

Unrecognisable Comasterid young forms.

Sp. 1 (St 47) C. XVIII 12—17 (usually 15—17), 4—8 mm. Opposing spine a little longer than the preceding ones. — Axillary h = 1/2 br. II Br—s in a regenerate 2 (2 cases). Arms XII, 30 mm. Syzygies with an interval of 3 or 4 oblique articulations. — P_1—P_4 with a comb, P_2 and P_3 often very small (1—2 mm.) $P_1 \pm 26$ (6 - 7 T) 5,5 mm. Distal p 12—13; 4,5 mm.

Disk 3,5 mm. Anal tube papillated, subcentral, narrow, 2 mm. sharply set off from the disk. Mouth marginal.

Differs by the formation of the disk from the above-described *Comatellas*.

Sp. 2 (St. 54) Cd 0,8 mm. C. XIII 9—10; 2,5—3 mm. 3[d] segment L = 2 1/4 br.

R—s h = 1/4 br, partly concealed by the angular Cd. I Br 1 h = 1/2 br. Axillary h = 2/3 br. Distal margins somewhat concave. Arms X, 15 mm. Br 1 h = 1/2 br, contiguous in pairs inside, not broader on the outside. Br 2 h = 1/2 br, a little broader on the outside. Syzygies usually 1—2, 3 + 4; Distally with an interval of 3 oblique articulations. Br-segments long, serrate and bent outwards. — P_1 with 8 heart-shaped T. P_2 and P_3 wanting. Distal p. 3 mm. — Disk 2,2 mm. Anal funnel 1 mm. 1 R calcareous plates.

Sp. 3 (St. 47) C. XI 8—9; 2,5—3 mm. — R—s h = 1/4 br. I Br 1 h = 1/2 br. Axillary h = 2/3 br. Arms XI. II Br—s 4 (1 case). The segments very serrate.

P_1 with 4—5 T. P_2 missing — Disk coarsely granulated with calcareous grains and plates. Small oral plates. Probably a *Comaster*.

Sp. 4 (St. 47) C. XIII 10—11; 2—2,5 mm. — R—s h = 1/2 br. I Br 1 h = 2/3 br. The arm-bases serrate. Arms X, + 10 mm. — P_1 with some few T (probably 5 to 6) rolled to a close globe. P_2—P_4 wanting. — Mouth central. Disk 1,3 mm. Orals!

From St. 45 there are, besides, 9 small young Comasterids. Some of these specimens apparently belong to the sub-family *Comasterinæ* (*Comaster* and *Comantheria*), but some of the others are practically impossible to determine either with regard to subfamily or to genus.

Sp. 5 (St. 45) C. XIV, 9, strongly bent. Arms XII, 15 mm. II Br-s 4. III Br-s 2. P_1 and P_2 and perhaps P_3 with a short comb. Mouth central. Anal cone smooth (a *Comantheria* or *Comaster*).

Sp. 6 (St. 45) C. XII 8—9; ± 2 mm. 4[th] segment the longest L = 3 × br. 5[th] and 6[th] segment L = 2 × br. Antepenultimate one L = 1 1/2 — 2 × br. — R—s band-shaped, h = 1/4 br. I Br 1 h = 1/3 br, laterally free. II Br-s : 4. Arms XII, 14 mm. — P_1 with 6 high T, 3 mm. P_2 and P_3 usually absent. P_4 with 4 T. No distal combs on the distal pinnules. — Mouth and anus subcentral. Disk 2 mm. Anal funnel papillated. — (Probably as sp. 7 a *Comaster*).

Sp. 7 (St. 45) C. XII 9—10; 2,5—4 mm. Arms X, 20 mm. somewhat smoother than in the preceding sp. — P_1 7 T, P_2 6 T, P_2 and P_3 wanting. — Mouth a little displaced. Anal cone strongly papillose.

Sp. 8 (St. 45) C. XIV 8—11; 2,5—4 mm. Arms XII, 16 mm. II Br-s 2. — P_1 7 T. P_2 and P_3 missing. Anal cone papillated.

Sp. 9. (St. 45) C. XVII 10—14; 3—4,5 mm. 3^{d} and 4th segment. L = 2 br. Arms X, 15 mm. of serrate type. P_1 5 high T. P_2 and P_3 absent.

Sp. 10 (St. 45) C. IX 7—9; 2—2,5 mm. Arms X, 12 mm. — $P_1 \pm$ 6 T. P_2 and P_3 wanting. Mouth central.

Sp. 11 (St. 45) C. XVI 10. Arms X, 10 mm. P_2—P_4 wanting.

Sp. 12 (St. 45) C. XVII 8—9. Arms X, ± 15 mm. P_1 9 T. P_2 missing, P_3 without a comb. — Anal tube smooth. — Perhaps *Commissia ignota minuta.*

Sp. 13 (St. 45) C. XIII 9—10; 3 mm. Arms X, broken. R—s concealed. — $P_1 \pm 6$ T, P_2 rudimentary.

Above I have brought together all the young Comasterids from the Bonin Island that I have not been able without doubt to identify to a certain species. With regard to some specimens, however, I am rather sure as to which species they belong by comparison with somewhat larger, systematically determinable specimens from the same locality. (This is for instance true of *Comaster serrata* sp. juv 1).

At the same time as the investigation made above I also tried to establish some characteristics of systematical value for the determination of the young Comasterids. Even a hasty reflection tells us at once that this is a very difficult task. For the systematical characteristics in the Comasterids, as in all Comatulids, are taken from the length, breadth, appearance and order of magnitude of the calcareous ossicles which combine to constitute the animal, and these are very different in young specimens and in full-grown ones. — If guided by the figures and statements given above one examines the characters, the following facts are evident.

1) The cirri in all young forms correspond to a type about the same as the one in *Comaster serrata* or *Comaiella brachycirra*, that is to a number of segments of ± 10, where the 3^{d} and 4th segments are the longest, L = 2 or 3 × br.

2) The higher division-series, which are an important characteristic of classification, have not yet appeared.

3) The proximal ossicles of the arm become longer compared with the breadth, the younger the animal is. This is also applicable to a still greater extent to the distal Br-segments. The distal ends of the Br-segments are serrate and bent outwards.

4) The comb on the proximal pinnules, a very reliable characteristic in adolescent and full-grown specimens, tends at an early stage to a uniform type and therefore all small young forms have combs with a few, high, rather large teeth. The young forms of the *Comaster*-genus only have combs on the proximal pinnules.

5) In the very earliest stages the disk has a central mouth and a marginal anal tube.

As a general rule one can say that young Comasterids which have a pinnule-gap on the proximal arm-parts (here of course excluding Comasterids of the *Comatilia* type) are impossible to determine even with tolerable certainty.

The comparison between the appearance of the disk shows, however, that here perhaps, one might get certain fixed points for the judgement of the systematical position of the animal.

The young of the species of *Comatella* and large *Comissia* have a central or subcentral mouth and a short, narrow, inconspicuous anal tube. The skin is tightly stretched on the ventral side between the arms so that the disk gets a characteristically lean appearance.

The young forms of *Comissia ignota minuta* are also in the early stages recognized by having the ambulacral furrows surrounded with cushion-shaped slopes, probably marking the extension of the gonads on the disk, and this condition together with the characteristic proximal Br-ossicles (already at an early stage very short), the coarse pinnule-bases, soon thickened by the genital glands, and the smooth proximal arm-parts make them fairly easy to distinguish from young forms of other species in the collection.

The young forms of *Comaster* and *Comantheria* in the early stages also have a »fat» (swollen) disk. The anal tube is large, thick and coarse, a little swollen, often (especially in *Comaster delicata grandis*) strongly papillated or plated. In *Comaster* — species the length-growth of the anal tube soon ceases, and in larger individuals the tube

gets a characteristic wart-shaped appearance, while in *Comantheria* it continues to lengthen to a long, large chimney. In smaller young forms the mouth is central, but except in *Comaster serrata* it is soon dislocated marginally.

The young of *Vania* has, if my determination is correct, a rather long unswollen anal cone, and a tolerably »lean» disk.

Naturally the fixed points obtainable by an examination of the disk, are only to be used together with the other characteristics which are found. If, however, in the comparison and systematizing of the Comasterid youngs one takes into consideration the appearance and formation of the disk, I believe that we will be able to predict with greater probability than otherwise to which species or genus the young Comasterid in question might be referred.

Zygometridæ A. H. Clark.

Catoptometra A. H. Clark.

C. Hartlaubi A. H. Clark.

Fig. 48—51.

Syn: *Antedon Hartlaubi* 1907 A. H. Clark Proc. U. S. Nat. Mus. Vol. 33, p. 72;

Zygometra Kochleri 1907 A. H. Clark Smiths. Misc. Coll. Vol. 50, p. 339;

Catoptometra Hartlaubi 1908 A. H. Clark Proc. U. S. Nat. Mus. Vol. 34, p. 317; 1912 Crin Ind. Ocean, p. 106; 1915 Monograph pp.; Journ. Acad. Sci. Vol. 5, p. 214; 1918 Siboga Exp. Vol. 42 B, p. 63.

From St. 5 = 1 specimen.

Sp. 1 Cd. large, flattened, a little deepened in the centre, with calcareous granules which towards the margin are arranged in about 10 rays. Diameter 5 mm. free dorsal pole 3,5 mm. h = 0,8 mm.

C. XXVIII 14—15 (D) 16—17 (V), 11—17 mm. in two close, alternating whorls, 2d segment cubical, 3d a little longer, slightly hour-glass-shaped (= most of the following cirrals), 5th—7th segment L = 2 br, then shorter again L = 1 1/2 — 1 1/4 br, without dorsal spines. Penultimate segment L = 1 1/5 br with dorsal medially placed, very weak opposing spine, h about 1/5 of the br of the segment. Terminal claw narrow, somewhat curved, longer than the preceding segment.

R—s and 1 Br 1 concealed by the overlapping Cd. The distal margin of 1 Br 1, however, visible, in syzygial articulation with 1 Br 2, which is triangular, h = 1/4 br. 1 Br-s 1 laterally united. II Br-s : 4. Primipostaxillaries united inside, twice as broad on the outside. II Br 1 h = 1/2 br, forms with the somewhat broader II Br 2 a projecting synarthrial tubercle. An inconspicuous similar one also between Br 1 and 2. Arms XX (or XIX, one arm broken in II Br 3 +), 70 mm. Br 1—8 discoidal. All the distal segments somewhat squeezed together at the middle with the ends furnished with small spines and bent outwards. Proximal segments short. Distal segments L = + br. Example of syzygies: 3 + 4, 11 + 12, 21 + 22, 30 + 31 . . distally with an interval of about 7 oblique articulations. 17 segments per cm. (15, if the syzygial pairs are counted as units).

P_{II} 29, + 7 mm. (7 first segments coarse, then more narrow). P_1 33; 13 mm. (The segments a little longer than broad, 2d—4th with small prominences resembling those on the proximal pinnules of, for instance, *Comatula pectinata*, but very much less developed). P_2 of about the same length. P_3 ± 10 mm., P_a ± 20; 5,5 mm. Genital pinnules 12 mm. Distal p. 20; 8 mm. (Basal pinnulars especially on proximal p. with small, spiny prominences). 3 pairs of small sacculi per segment. — Disk thrown off. Colour (in formol) white.

Closest to *C. Hartlaubi*, from which it differs by the occurrence of an opposing spine and the pinnules which, compared with the arm-length, are somewhat longer.

Catoptometra magnifica var. minor n. var.

Fig. 46, 47.

From St. 46 (1), 47 (3), 59 (3), 61 (1) = 8 specimens.

Sp. 1 (St. 59) Cd flat, dorsal free pole granular, 3,5 mm. C. XXV 20—21; 17—22 mm. in a partly double whorl. 1st and 2d segments short, 3d cubical, 4th a little longer, 5th and 6th segment L = about 1 1/3 × the distal br, the length then slowly decreasing. Proximal segments hour-glass-shaped with the distal ends especially widened. Usually no dorsal spine except on the antepenultimate segment. This cirral L = 1 1/4 br. Opposing spine inconspicuous h = 1/4 of the br of

the segment. Terminal claw pointed, L about the same as the preceding segment.

R—s very narrow bands, partly hidden by the able-formed Cd. I Br 1 laterally free h = 1/4 br, in syzygial articulation with I Brax, which is low pentagonal h = 1/3 br. II and III Br-s: 2. Arms XXIV, broken. II Br 1 and 2 with a weak synarthrial tubercle. Ex. of syzygies: 3 + 4, 8 + 9, 14 + 15 . . then with an interval of 4 to 5 oblique articulations. Br 1—10 discoidal, then oblique segments, distally with small spines and somewhat overlapping.

P_1 22; 5,5 mm. P_2 36; ± 10 mm., P_3 40; 13 mm.; P_5 29, ± 9 mm., P_{10} 15; 6 mm. P_1 to about P_7 with 1st to 5th or 6th segments provided with large prominences. h = 1/3—1/4 of the br of the segment. Distal p. ± 20; 6 mm. Proximal segments distally somewhat serrate and widened.

Disk incised, largest diameter 13, shortest 8 mm., with fine calcareous granules. Mouth central.

Sp. 2 (St. 59) Cd as before, 4 mm, dorsally with small papillæ. Free dorsal pole 3 mm. C. XXIV 15—19; 9—11 mm. Opposing spine h = 1/3 of the br of the segment.

II and III Br-s: 2. Arms partly broken, XXI (perhaps still II) arms, 60 mm. I Br 1 h = 1/3 br. Lateral borders of the I and II Br series a little spiny. Syzygies with an interval of 4 to 5 oblique articulations.

P_1 22—24; 3,5—4 mm. P_2 (in a regenerate) 25; 5 mm., P_4 22; 6 mm. The carination on the proximal p. only from P_1—P_3. Distal p. 4,5 mm. (The length of the segments = 3 × br). — Disk 6 mm. Anal cone 1,7 mm.

Sp. 3 (St. 59) Cd 5 mm., free dorsal surface 3,5 mm., radially furrowed. C. XXII 19—20; 16—18 mm. in a double-whorl. — Arms XXIII, broken. I Br 1 h = 1/8 br, laterally free. I Brax h = 1/3 br. II and III Br-s 2, in one case, however, II Br 3 (1—2—3, without a p.). Proximal segments with 3—4 small lateral knots, which on I Br 1 ornament the whole proximal margin, a similar ornation, though less distinct, on II and III Br 1. Primipostaxillaries grown together inside in 3/4. — P_1 25, ± 5 mm.

Disk incised. Longest diameter 12, shortest 6 mm.

This specimen differs from the preceding ones by its lighter colour and by the ornation of the proximal ossicles.

To this species belong a number of young forms with X—XII arms, of which I describe a specimen from St. 46:

Sp. 4 (St. 46) Cd almost hidden by Cirri. C. XXIII 10—14; 3—7 mm. 1st segment short, 2d cubical and hour-glass-shaped, 3d segment L = 1 1/2 br, 4th L = 2 × br, strongly hour-glass-shaped, then shorter segments. Antepenultimate one L = 1 1/4 br. Opposing spine h = 1/3 of the br of the segment. Terminal claw a little shorter than the preceding segment.

R—s rounded, smooth, disto-laterally well separated. I Br 1 h = 1/3 br, united with I Brax in syzygial articulation. I Br 2 h = 1/2 br. Example of syzygies: 3 + 4, 10 + 11 etc. with an interval of 6 oblique articulations. II Br-s 2 (a very young regenerate). Arms XII, 35—40 mm., slender. The segments smooth, rather long, and a little hour-glass-shaped. The arm-bases well separated, leaving broad spaces of the perisome visible.

P_1 22; 4 mm., P_2 20; 4,2—5,5 mm., P_3 19; 4,3 mm., P_4 15; 3,8 mm., P_6 3 mm. Basal segments with weak prominences. The L of the distal segments = 2 × br. Distal p. 18; 5 mm. with very long pinnulars, L = 4—5 × br.

Disk incised, with calcareous granules at the ambulacral furrows. Anal cone long, narrow, 1,5 mm.

Sp. 5 (St. 47) I Br 1 h = 1/2 br. Syzygies with an interval of 3—4 oblique articulations. Otherwise as for the following sp. see the scheme p. 27.

Sp. 6 (St. 47) I Br 1 h = 3/4 br. Syzygies with an interval of 4—8 oblique articulations.

Sp. 7 (St. 47) I Br 1 h = 1/2 br. Syzygies with an interval of 6 oblique articulations. P_6 14; 3,5 mm. Disk »lean», incised 2—3 mm. Anal funnel 1,5 mm.

Sp. 8 (St. 61) I Br 1 h = 1/2 br. Syzygies with an interval of 5—7 oblique articulations. In these small specimens the prominences on the proximal p-s are indiscernible.

The above-described specimens differ from *C. magnifica* by having fewer arms, shorter cirri, and very much shorter proximal pinnules. These differences are also to be found in specimens in Dr. Mortensen's collection, and therefore I wish to separate the form as a new variety: *minor*.

Eudiocrinus P. H. Carp.

Eu. indivisus (Semper).

Fig. 52.

Syn.: *Ophiocrinus indivisus* 1868 Semper Arch. Naturgesch. I, p. 68.
Eudiocrinus indivisus 1882 P. H. Carpenter Journ. Lin. Soc. (Zoöl.) Vol. 16, p. 495; 1888 Chall. Rep. Vol. 26 p. 81 ff.; 1912 A. H. Clark Crin. Ind. Oc., p. 102; 1915 Monograph. p. 37, 42, 50; 1918 Siboga Exp. Vol. 42 B, p. 65.
? Eudiocrinus granulatus 1894 Bell. P. Z. S. p. 397; 1913 A. H. Clark Smiths. Misc. Coll. Vol. 61: 15, p. 21

From St. 59: 1 specimen.

Sp. 1 Cd 3 mm., free dorsal pole 2 mm., flattened, with a somewhat arched dorsal surface.

C. XIX 19—21; 11—15 mm. in a single or double whorl. 1st — 3d segments short, 4th—7th L = 1 1/2 — 2 the median br, like the following cirrals strongly hour-glass-shaped. The distal segments shorter. Antepenultimate one not very much longer than broad (L = 1 1/5 br). 14th—18th segments less swollen at the ends. Opposing spine h = 1/3 of the br of the segment. Terminal claw somewhat longer than the preceding segment.

R—s nearly concealed, the visible border adorned with small knots. 1 Br 1 + 2 with a weak median prominence. The arm-bases smooth, without longitudinal prominences as in *Eu. variegatus*. A prominence between Br 2 and 3 formed in the oblique articulation on the right. A similar knot on the left between Br 4 and 5, and one more on the right between Br 5 and 6, then less pronounced. Arms V, broken. Breadth of Br 1 : 1,9 mm. Ex. of Syzygies: 3 + 4, 8 + 9 . . . After Br 10 oblique articulations. Out to Br 4 small, ventro-lateral rows of knots.

P_1 10; 4 mm. P_1 10; 4 mm. P_2 10; 7,5 mm. P_2 11; 8 mm. These p. extraordinarily coarse and thick, sharply triangular; 3d segment on P_1 and P_2 about cubical. The distal segments, L = 1 3/4 br, without distal, spiny borders. P_1 and P_3 much more slender, the latter 17; 8 mm. L of the segment 2 1/2 — 3 × br.

Disk thrown off, probably about 3 mm. Colour yellow-brown.

This specimen is closest to *Eu. indivisus*, though the longest cirrals are rather short to belong to this species. Nevertheless it has

considerably longer cirri than the above-mentioned species and in this respect approaches *Eu. granulatus* Bell which, according to A. H. Clark, is synonymous with the first-mentioned species. On the figure of *Eu. granulatus* by Bell P_b (? P_2, for, though the arm is drawn from the left side, still the pinnules stand on ossicles corresponding to P_1 and P_2; a faulty drawing?) has 26 segments and has a length of 22 mm. P_a (P_1) has 16 segments. If the figure is correctly drawn, the existence of *granulatus* ought to be authorized at least as a variety.

Eudiocrinus gracilis var pulchellus n. var.

Fig. 60—63. Photo 5.

From St. 45 (5), 46 (2), 47 (2), 48 (1), 53 (1) = 11 specimens.

Sp. 1 (St. 46) Cd flattened 1,5 mm., free dorsal pole 1 mm.

C. XIX 13—15; 5,5—6,5 mm. 1st and 2d segments shorter than long, 3d L = br, 4th—6th segment L = + 2 × the median br, then the segments shorter again. Antepenultimate cirral L about = br.

R—s smooth 1 Br 1 h = br. Br-s not overlapping even in distal segments. The proximal muscular articulations dark-coloured. From Br 7 oblique joints with a couple of dark longitudinal bands. Syzygies: 3 + 4, 9 + 10, 13 + 14 etc. with an interval of 3 oblique articulations. Arms V, 40 mm. Breadth of Br 1 = 0,8 mm.

P_1 10; 2,5 mm. P_1 10; 3 mm. P_a 10; 4 mm., P_2 12; 4 mm. (2d segment of P_a and P_2 L not fully as large as br, 3d segment somewhat longer than broad — L = 1 1/3 — 1 1/2 br — distal segments L = 3 × br, a little widened at the distal ends but only slightly spiny), P_b 11; 3,5 mm., P_3 12; 3,5 mm. Distal p. 15—16; 5,5 mm. (The L of the pinnulars = 3 — 4 × br. The last segments with dorsal hooks. 3 pairs of large sacculi per segment).

Disk thrown off, has been about 2 mm.

Sp. 2 (St. 46) 3d segment on P_1 and P_a L = 1 1/3 br. Anal funnel 0,8 mm. Disk 1,5 mm. For further details see the table as for the following specimens.

Sp. 3 (St. 45) Cd 1 mm., free dorsal pole 0,5 mm. 3d segment of P_1 and P_a as in Sp. 2. Disk 2 mm.

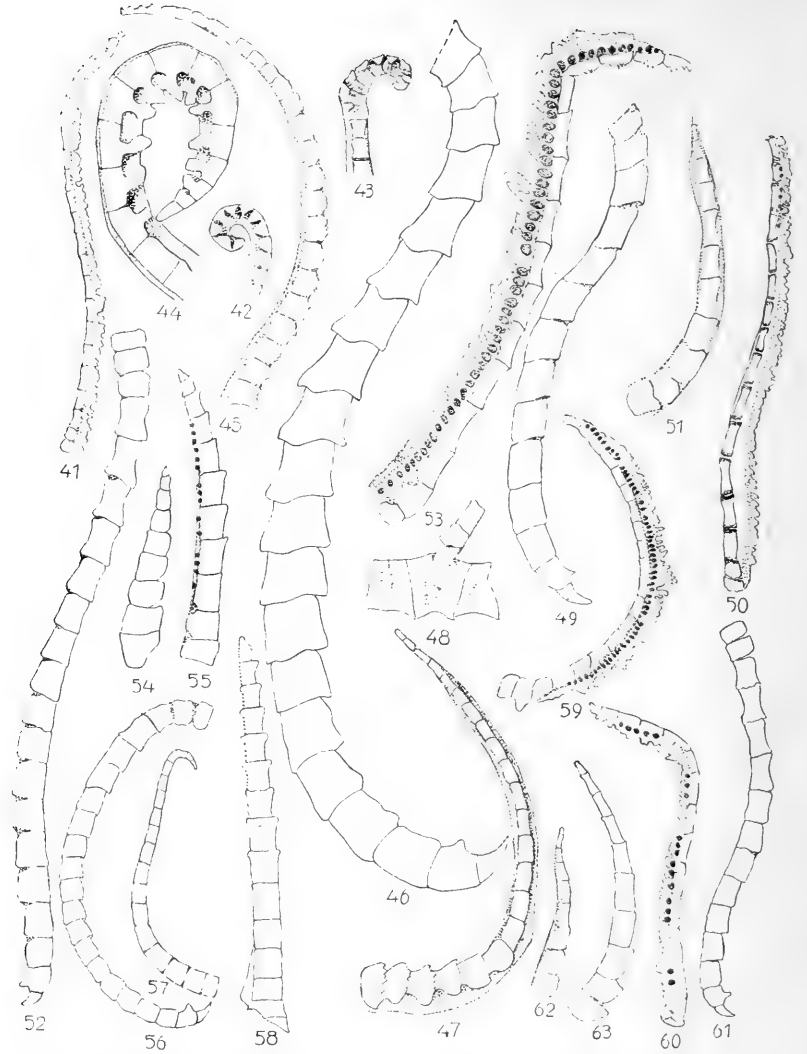

Fig. 41–43. *Comanthus parvicirra α comasteripinna* (St. 40) 41) Distal pinnule $^{9}/_{1}$, 42) PII: the tip with 9 T., × 17 $^{1}/_{2}$, 43) The tip of P_{13} also with 9 T. (observe the supporting ridges), × 17 $^{1}/_{2}$; 44, 45 *Comanthus parvicirra β comanthipinna* (St. 40). 44) The tip of P_{1} $^{14}/_{1}$, 45) Distal pinnule; coarse, short segments $^{14}/_{1}$; 46, 47 *Catoptometra magnifica minor* (St. 59). 46) Cirrus $^{9}/_{1}$, 47)

Sp. 4 (St. 45) The segments of distal pinnules L = 3 × br. Disk 2 mm.

Sp. 5 (St. 45) Disk as in Sp. 4. — *Sp. 6* (St. 45) the proximal border of I Br 1 very slightly bent outwards. P_2 and P_3 with rather serrate distal segments. Disk 2 mm.

Sp. 7 (St. 47) Cirral 5 L = 2 br, hour-glass-shaped. 3d segment on P_1 and P_a L = 1 1/3 br. P_c 12—13; 4,5 mm. Distal pinnulars (on the distal p.) L = 3 — 3 1/2 × br. Disk 2 mm.

Sp. 8 (St. 47). The cirrals a little shorter (L = 1 1/2 — 1 3/4 br). 3d segment of P_a L = 1 1/2 br. Disk 1,8 mm.

Sp. 9 (St. 48). 3d segment of P_a L = 1 — 1 1/4 br. The segments of the distal p. L = 2 × br.

From St. 45 and 53 there are 2 very small specimens with very serrate arm-bases. *Sp. 6* (St. 45) presents a transition form to these ones and shows that they are young forms of the above-described species.

Description as follows (for statements as to the figures see the table):

Number of Specimens and Stations	Cirri			Arms	P_1		P_1		P_a		P_2		P_b		P_3		Dist. p.	
	N	S	L	L	S	L	S	L	S	L	S	L	S	L	S	L	S	L
Sp. 1 (St. 46)	XIX	13—15	5,5—6,5	40	10	2,5	10	3	10	4	12	4	11	3,5	12	3,5	15—16	5,5
Sp. 2 (St. 46)	XVII	10—14	4,5—6,5	30	8	2	8	2	10	3,5	10	3,2	12	—	—	—	14	5
Sp. 3 (St. 45)	XIX	13—15	4—6,5	35	7—8	2	9	2,5	11	3,5	—	—	12	—	—	—	18	6
Sp. 4 (St. 45)	XV	14—15	5—6,5	40	8	2,2	9	2,7	10	4,5	11	4,5—5	—	—	—	—	18	6,2
Sp. 5 (St. 45)	XVIII	12—13	3,5—5	25	9	2,2	9	2,4	10	3,3	10	3	12	3,2	13	3,2	—	—
Sp. 6 (St. 45)	± XX	13—14	4—5	23	6—7	1,8	8	2,2	9	3,2	9	2,7	10	3	11	3,5	—	—
Sp. 7 (St. 47)	XVI	13—16	6,5—8	40	8	2,5	8	—	—	—	13	5	—	—	—	—	18	7
Sp. 8 (St 47)	XVI	12—15	5—6	35	7	2	8	—	13	4,2	12	—	12	4	—	—	—	—
Sp. 9 (St. 48)	XIV	14—16	6—7	30	8	2	9	2,2	13	3,7	—	—	11	3,5	—	—	14	4,5
Sp. 10 (St. 45)	XX	11—12	2,5—3	± 20	6	1,5	6	—	8	2	—	—	—	—	—	—	—	—
Sp. 11 (St. 53)	XV	8—12	2—4	10 +	6	1,2	7	1,2	7	—	—	—	—	—	—	—	-	-

Genital pinnule 14/1; 48—51 *Catoptometra Hartlaubi* (St. 5), 48) Some Br-segments and the base of a distal pinnule 14/1, 49) Cirrus 9/1, 50) Distal pinnule (the tip missing) 14/1, 51) Genital pinnule (observe fewer and stouter segments than in the distal pinnule; fig. 48 from the intermediate territory) 14/1; 52) *Eudiocrinus indivisus* (St. 59) Cirrus 9/1; 53—56 *Eudiocrinus Lorcai* (Sp. 1) 53) Distal pinnule 14/1, 54) P_1 (observe the peculiar form of the basal segments) 14/1, 55) P_a 14/1, 56) Cirrus 9/1; 57—59 *Cenometra bella* (St. 49) 57) P_1 9/1, 58) P_2 (1/2 of the first segment cut away) 9/1, 59) Distal pinnule (4 pairs of sacculi per segment, the last pinnular a little incised) 9/1; 60—63 *Eudiocrinus gracilis pulchellus*, 60) Distal pinnule 14/1, 61) Cirrus 14/1, 62) P_1 14/1, 63) P_a 14/1.

Sp. 10 (St. 45) 3d cirral: L = 1¼ × the distal widened part of the segment. 4th segment, strongly hour-glass-shaped, L = 2 × the diameter of the distal part. 5th and 6th segment proximally a little narrower. 7th to antepenultimate one laterally compressed L = 1½ br. Opposing spine sharp, h = ½ of the br of the segment. Terminal claw pointed, curved, somewhat longer than the preceding segment.

R a narrow band with a median prominence, separated at the corners by the B—s. I Br 1 proximally bent outwards with a median keel, h = ⅓ of the thickness of the segment, laterally viewed. A similar prominence on the distal part of I Br 2 and Br 1 and 2, where laterally, however, it has no distinct border. The ends of the segments a little bent outwards. From Br 8 oblique joints. Ex of syzygies: 3 + 4, 13 + 14 and then with an interval of 3 (to 4) oblique articulations. Arms V, ± 20 mm., distally tolerably smooth.

2d to 4th pinnulars of P_1: L = 1½ br. 3d to 5th segment of P_3 L = 2 × br. The distal ends of the segments spiny and somewhat bent outwards. The pinnulars of the distal pinnules very long (L = 4—5 × br). — Disk 1 mm. Colour (in spirit) yellow-white. The sacculi are dark. The anal cone smooth, subcentral. Mouth subcentral.

Sp. 11 (St. 53) Strong prominences on the proximal ossicles as in Sp. 10. 3d segment of P_3 L = 1½ × 1¾ br.

The two last-described specimens are of an ornate type but evidently young forms of the preceding specimens.

The full-grown specimens differ from *Eu. gracilis* by their smaller size, by having more but shorter cirri, and by P_1 and P_2 being not much longer or more slender than the rest of the proximal pinnules.

Eudiocrinus Loveni n. sp.

Fig. 53—56. Photo 6.

From St. 47 = 1 specimen.

Sp. 1 Cd 1,8 mm. C. XX 20—21; 9—10 mm. 1st and 2d segments shorter than long. 3d cubical, 5th—7th L = 1¼ × br. The segments are smooth, slightly hour-glass-shaped, rather coarse. Opposing spine h = ⅔ of the br of the segment. Terminal claw curved, L = the preceding segment.

R—s narrow, smooth bands, h = 1/5 br. I Br 1 + 2 h = br, as Br 1 and 2 with ventro-lateral, rather pronounced ledges. Br 1 br = 1,4 mm. Syzygies: 3 + 4, 8 + 9, 12 + 13 etc. with an interval of 3 oblique articulations. Arms V, 40—45 mm. smooth.

P_I 9; 3,5 mm. (1—3 or 5 segments with a distally directed crista. 1st segment much decreasing proximally, 2d segment broadest. The h of the crista = 1/3 of the br of the segment, compare the figure), P_1 10; 4 mm., similar to the preceding, P_a 11; 5 mm. (3d segment L = 1 1/2 br, distal segments with a somewhat spiny border, L = 2 — 2 1/2 br), P_2 11; 5 mm., P_b 12; 5 mm., P_3 11; 5 mm. (with a small spiny garland on the distal segments). Distal p. 16—17; 4,5 mm. (the segments' L = 3 br, the 3 last ones with dorsal hooks; 4 pairs of large sacculi per segment).

Colour: Cirri white. Arms dorsally brown with white transverse spots. The pinnulars whitish, the sacculi dark-coloured (in alcohol).

At first I had some doubt whether this specimen was not only a full-grown specimen of those described as *Eu. gracilis pulchellus*. Nevertheless some differences are of such a nature that I have been obliged to believe that the specimen differs not only by characteristics of age. The most important differences are as follows:

1) The cirrals are short, not very much longer than broad, not at all or only slightly hour-glass-shaped (Cf. *Eu. pinnatus* and *variegatus*). 2) P_1 and P_I are on the proximal segments provided with prominences that are lacking in *Eu. gracilis pulchellus*. By these prominences it approaches *Eu. venustulus*. 3) Further *Eu. Loveni* differs from *Eu. gracilis pulchellus* by the arms which, though of about the same length as in the last-mentioned species, are much coarser, 4) by the more spiny borders of the distal segments of P_2 and P_3, 5) by the relatively short distal pinnules.

The newly proposed species, which I have called after the late Prof. S. Lovén, is thus a peculiar type connected with many species within the genus *Eudiocrinus*.

Mariametridæ A. H. Clark.

Liparometra A. H. Clark.

L. grandis A. H. Clark.

Fig. 85, 86.

Syn: *Himerometra grandis* 1908 A. H. Clark Wash. Proc. Biol. Soc. Vol. 21, p. 222.

Dichrometra grandis 1909 A. H. Clark Proc. Biol. Soc. Vol. 22, p. 13; 1912. Crin. Ind. Oc., p. 150.

Liparometra grandis 1913 A. H. Clark Wash. Proc. Biol. Soc. Vol. 26, p. 143; 1915 Journ. Acad. Sci. Vol. 5, p. 214; 1918 Siboga Exp. Vol. 42 B, p. 103.

From St. 39 (1), 47 (1) = 2 specimens.

Sp. 1 (St. 39) Cd discoidal, free dorsal pole 2,5 mm. C. XXIX 27—30 (D) 31—38 (V), 16—24 mm. in two close whorls. 1st—3d segment with a little convex proximal and concave distal margins in lateral view. 4th and the following segments slowly increasing to L = br (at the 15th or 20th segment). No dorsal spine. Opposing spine small, coarse, blunt-ended, h = 1/3 of the br of the segment. Terminal claw short, coarse, L = the preceding segment.

R—s narrow bands. I Br 1 h = 1/5 br, in lateral apposition. I Brax low pentagonal, h = 1/3 br, with concave distal margins. I Br 1 and 2 form a low synarthrial tubercle. II and III Br—s: 2, (III Br—s in 6 cases on the outer sides). Primipostaxillaries united inside. Arms XXVI, 120 mm. The br of Br 1 = 1,6—1,8 mm. Br 2 twice as long on the outside. The first 10 Br-segments rectangular, h = 1/2 br, then slightly oblique joints.

1st syzygy usually between Br 3 and 4 but often exceptions (see the example). Distally with an interval of 7—12 oblique articulations. Example of arm-division:

I 1—2 { II 1—2 { III 1—2 { Br 1 2 3 4 5 6 7 8 + 9 . . . 20 : 21 . . . 30 : 31 . . .
Br 1 2 3 4 5 6 7 8 + 9 . . . 18 + 19 . . . 28 + 29 . . .
Br 1 2 3 4 5 + 6 . . . . . 21 + 22 . . . . 30 + 31 . . . 41 + 42 . .
II 1—2 { }

Example of the distribution of the distal syzygies (from arm 3, in the above-quoted example) . . 30 + 31 . . . 41 + 42 . . . . 52 + 53 . . . 65 + 66 . . . 78 + 79 . . 90 + 91 . . 101 + 102 . . . 109 + 110 . . Distal segments discoidal, short, L = 1/2 — 1/3 br. Lateral profile rather smooth. 17—18 segments per cm. (16, if the syzygial pairs are counted as units). The arms are very close to one another (interspaces chiefly between I Br 2—Br 4 on the outer side of the divisions).

P_1 (9—)18—21; (4—)11 mm. (the 4th and the following segments slender, L = 1 1/2 —2 br. like the segments of following pinnules smooth). P_2 19—25; 11—18 mm., P_3 17—20; 14—16 mm. (in a single case only 8; 4 mm., is a young regenerate), P_4 14—16; 10—13 mm., P_8 14; 6,5 mm. Distal p. ± 20; 8,5 — 10,5 mm. (The L of the segments = 2 × br).

Disk strongly incised, smallest diameter 5, largest 7 mm. The soft parts do not cover the whole ventral surface of the division-series. Colour: violet with lighter and darker transverse bands on the arms.

Sp. 2 (St. 47) C. XXIII (11—)14—17; (3,5—)5,5—7 mm. 5th — 7th segments longest, L = 1 1/2 br. No dorsal spines; the segments are, however, laterally compressed, forming a very weak carina. Opposing spine: h = 1/3 — 1/4 of the br of the segment.

R—s as before. I Br 1 h = 1/3 br, with slight, lateral prominences. I Brax h = 3/4 br, almost 6-angular by the backward directed median synarthrial tubercle. Arms X, 27 mm. Br 1 united inside, 1/2 as wide outside with a convex outer margin (= an indistinct lateral prominence). 1st syzygy between Br 3 and 4 distally with an interval of 5—7 oblique articulations. The Br-segments smooth.

P_1 13—15; 4,5—5,5 mm. (Longest segments: L = 2 1/2 br), P_2 13; 5 mm. (Segments to 3 × br), P_3 10; 3 mm., P_4 9; 2 to 3 mm. Then longer p-s again. Distal p. 15; 4,5 mm.

Disk incised 2,5—4 mm., whitish. Otherwise the animal is red-brown.

The specimen described last might perhaps, because of the short 3d pinnula, be a young of *Lamprometra protectus*. It is, however, to be noticed that it is not until a rather advanced stage that the young forms obtain the relation between the lengths of the proximal pinnules which is peculiar to the full-grown species. For P_1 is first formed, then P_2, and finally P_3. The above-mentioned shortness of P_3 might therefore be ascribed to the youth of the animal.

The length of the proximal p—s in Sp. 1 is, as shown above, very variable. It seems to me to be rather unfortunate within this family to base the characteristics of genus on the relation between the length of P_1, P_2 and P_3, as has been done in the genera *Liparometra*, *Lamprometra* and *Dichrometra*, which surely are very closely related to each other.

Colobometridae A. H. Clark.

Cenometra A. H. Clark.

C. bella (Hartlaub).

Fig. 57—59, 74.

Syn.: *Antedon bella* 1890 Hartlaub Nachr. Ges. Göttingen 1890, p. 174; 1891 Leop. Carol. Cur. Vol. 58: 1; p. 43.

Cenometra bella 1909 A. H. Clark Wash. Proc. Biol. Soc. Vol. 22, p. 8; 1912 Crin Ind. Oc., p. 153; 1915 Journ. Acad. Sci., Vol. 5, p. 214; Monograph pp. 48, 67.

From St. 49: 1 specimen.

Sp. 1. Cd thickly discoidal (h = 1,5 mm.) with raised margins round the free dorsal surface, the diameter of which is 2 mm. — C. XXVI 34—38; 16—18 mm. in two whorls. The 12 first segments: L about $^1/_2$ — $^2/_3$ br, the following ones similar or a little shorter. The distal half of the cirrus with a low transverse ribbon, which is indistinctly (or not at all) divided into two tubercles (slightly projecting in lateral view). Opposing spine: h = $^1/_2$ of the br of the segment. Terminal claw coarse, blunt-ended, L about the same as the preceding segment.

R—s h = $^1/_4$ br, most apparent in the corners, baso-laterally united. I Br 1 h = $^1/_3$ br, laterally free, forming with I Brax a distinct synarthrial tubercle. I Brax h = $^2/_3$ br, pentagonal. A ventro-lateral prominence on each ossicle from I Br 1 — Br 1, largest on II Br 1, where it occupies the whole side of the ossicle and reaches $^1/_5$ of the lateral h of the segment. II and III Br—s: 2 (the latter ones on the outer sides). Primipostaxillaries basally united inside. Arms XXVI, 90 mm. Syzygies: 3 + 4, 12 + 13, distally with an interval of 7 (—10)

oblique articulations. The Br-segments rather smooth, 21 segments per cm. (18, if the syzygial pairs are counted as units). The longer side of the distal brachials, L = $^2/_3$ br, the shorter one L = $^1/_2$ br.

P_1 18; ± 5 mm., P_2 15—16; 9 mm. (very much stiffer and twice as coarse or more than the other p—s. The distal ends of the pinnulars from the 6th segment thickened and with a spiny garland). P_3 12; 4 mm., P_4 similar, P_a always present though often only 2—3 mm. Distal p. 17—18; 7,5 mm. (distal pinnulars L = 2—3 × br).

Disk incised 8—11 mm. in diameter. Colour white with small brown spots. Anal cone short, pointed, 2,5 mm. The distal half of the p. quite violet-brown, the arms lighter with brown spots.

Differing from *C. bella* only by somewhat more cirri, which usually have transverse crista instead of a pair of tubercles, and by the primipostaxillaries, which are only united basally.

Cyllometra A. H. Clark.

C. disciformis (P. H. Carp.).

Fig. 68—69.

Antedon disciformis 1888 P. H. Carpenter Chall. Rep. Vol. 26, p. 228.

Cyllometra disciformis 1912 A. H. Clark Crin. Ind. Oc., p. 158; 1913 Smiths. Misc. Coll. Vol. 61: 15, p. 34; 1915 Monograph; 1918 Siboga Exp. Vol. 42 B, p. 116.

From St. 12 (1), 332 (1), 35 (1) = 3 specimens.

Sp. 1 (St. 35) Cd discoidal, free dorsal part 2 mm. C. XV 25—27; 13—15 mm. in an almost single whorl. 3d and 4th segments cubical, 5th—7th one slightly longer than broad, then shorter again, the distal ones L = $^2/_3$ br. The 5th(or 7th) to the 12th segment with a small dorsal transverse ribbon with an excavation in the middle forming an indistinct double tubercle, from about the 13th segment a simple dorsal spine, h = $^1/_4$ of the br of the cirral. Opposing spine h = $^1/_2$ of the br of the segment. Terminal claw about as long as the preceding segment.

The distal borders of the R—s visible under the Cd. I Br 1 h = $^1/_5$ br, laterally free. I Brax h = $^1/_3$ br. Primipostaxillaries united

inside. II Br—s: 2. Arms XVI, 90 mm. slender, smooth, well separated basally. Inconspicuous synarthrial tubercles. The br of Br 1: 1,1—1,2 mm. Example of syzygies: 3 + 4, 11 + 12, 17 + 18 etc., distally with an interval of 3—4(—5) oblique articulations. Br 1—7 discoidal, then oblique joints. The longer side of the distal Br—s: L = br. 19—20 segment per cm. (15, if the syzygial pairs are counted as units).

P_1 15; 5,5 mm. smooth, P_2 19; 9—9,5 mm. (5^{th}—12^{th} segment: L = 2—2 1/2 br, with spiny prominences on the distal ends of the segments. The tip of the pinnule usually smooth), P_3 14—15; 7—7,5 mm. similar to the preceding. P_4 (12; 4 mm.) and the following ones smooth. Distal p. 20—22; 8 mm. (1^{st} and 2^{d} segment short, coarser than the following ones, the distal end of the 2^{d} segment therefore forms a weak notch against the outer segments which are longer, L = 2 — 3 × br; the last segment provided with microscopic dorsal hooks). Disk thrown off.

Cirri and division-series white. The distal parts of the arms spotted with red-brown. Proximal pinnules white, the other p—s with strongly coloured sacculi (which are about 4 pairs per segment) and otherwise light brown-violet.

The scheme given below is an example of the pinnulation of the proximal arm parts. P_1 is always lacking on the inner side, when there are 4 arms on a I Brax.

therefore I 1–2 { Br 1—$\bar{2}$ 3 + 4 $\bar{5}$ $\underline{6}$ $\bar{7}$; II 1–2 { Br 1—$\bar{2}$ 3 + 4 $\bar{5}$ 6 $\bar{7}$; Br 1—$\underline{2}$ 3 + 4 $\underline{5}$ $\bar{6}$ $\underline{7}$ }

but I 1—2 { II 1—2 { Br 1—$\bar{2}$ 3 + 4 $\bar{5}$ $\underline{6}$ $\bar{7}$; Br 1—2 3 + 4 $\underline{5}$ $\bar{6}$ $\underline{7}$ } ; II 1—2 { Br 1—2 3 + 4 $\bar{5}$ $\underline{6}$ $\bar{7}$; Br 1—$\underline{2}$ 3 + 4 $\underline{5}$ $\bar{6}$ $\underline{7}$ } }

[V] *Sp. 2* (St. 33) Probably also belonging to this species (possibly a young *C. albopurpurea*).

Cd 0,8 mm. C. XX 15—18; 5—6 mm. (the dorsal C. 12; 2,5 mm.). The L of the segments at most 1 1/3 br. 4^{th}—8^{th} segment with a double dorsal spine, then a single prominence in the middle of the segment. Antepenultimate segment usually smooth. Opposing spine h = 1/2 of the br of the cirral. Terminal claw as long as the pre-

ceding segment. The first segments proximally somewhat narrower, and therefore a rather serrate proximal profile.

R—s narrow bands. I Br 1 h = 3/4 br, laterally free. Axillary h = 1/4 br. Br 1 h = 1/2 br, basally united inside. Arms X, 25 mm. Syzygies with an interval of 3—4 oblique articulations. Distal Br-segments L = 1 1/2 br, smooth.

P_1 6—7; 2 mm. $P_2 \pm 10$; 4 mm. P_3 7—8; 2,5 mm. P_a lacking. P_b 9; 2,5 mm. (3d and the following segments L = 2—3 × br, smooth). Distal p. ± 3,5 mm.

Disk thrown off. Colour: violet spots on a white ground.

A young specimen of *Colobometridae*, probably referable to this species, is also:

Sp. 3 (St. 12) Cd discoidal, br 1,5 mm. — C. X 16—18; 5,5—6 mm. The cirrals are rather short, the longest ones L = the distal br. From the 4th—7th segments a transverse crista. A single dorsal spine from the 7th cirral.

I Br 1 and 2 with a weak longitudinal carination. Arms X, broken. Syzygies: 3 + 4, 9 + 10, 14 + 15 etc. with an interval of 3 oblique articulations.

P_1 10, shorter than P_2, which is 11; 4 mm. P_3 9; 3 mm. P_5 11. P_a absent. Disk thrown off.

Fixed on an *Acanthogorgia Dofleini* Kükth. & Gorz.[1]

Though *C. disciformis* is evidently very closely related to *C. manca* I have, however, kept them as separate species. A. H. Clark distinguishes the first-mentioned one from *C. manca* by the long proximal cirrals. Nevertheless at the same time he states (Siboga Exp. Vol. 42 B, p. 116) that the length of the cirrals rapidly decreases in specimens of *C. disciformis* from deeper water. The deepest localities from which this species has previously been dredged are 180 fathoms. The above-described specimens are found at depths of 400 and 90 to 200 fathoms respectively and have therefore very short cirrals approaching those of *C. manca*. I have described below a specimen from Kiu Shiu Islands belonging to this species. In this one the cirrals are never longer than broad. It is moreover a smaller form than the above-described species from shallower water but in spite of that with shorter cirrals. The larger *C. disciformis* seems also to have fewer arms in

[1] For this information I am indebted to my friend Mr. Magnus Ahrivillius.

proportion to the length of the arms. A distinguishing characteristic of value might also be the distribution of the syzygies. In *C. disciformis* the syzygies are separated by 3 to 4, in *C. manca* by 9 to 10 oblique articulations. This difference is also to be found in the original descriptions, where the first-mentioned species is said to have syzygies with a syzygial interval of 2—6, the latter with an interval of 4—10 (usually 7—8) joints. The preceding species also seems to be more slender and to have longer and narrower distal pinnules than the one described below.

It might be worth while to call attention to the fact that the genus *Cyllometra*, as also many other *Colobometrids*, approaches in many respects the *Antedonid* subfam. *Perometrinæ*. Both groups have an inconstant P_a. The *Colobometrids*, being an *Oligophreat* family, have unusually long pinnulars and cirrals, where the first-mentioned ones especially are very similar to those of the *Antedonidæ*. *Perometrinæ*, on the other hand, being a *Macrophreat* family, has short cirrals and pinnulars. The basal rays are often absent in the *Colobometridæ* and the rosette very similar to that of the *Macrophreats*. Also the centrodorsal cavity is unusually large. A feature distinguishing *Colobometridæ* from *Perometrinæ* is the occurrence of a double spine-row or a transverse crista on the proximal cirrals. On the distal segments, however, the dorsal spine is single. If a reduction of the spines of the proximals cirrals took place, we might probably refer a *Colobometrid* to *Perometrinæ*. It seems therefore as if we should find connections between *Colobometridæ* and *Perometrinæ;* the latter is possibly in this case to be deduced from the former and has developed convergently with the *Antedonid* typus (cf. p. 89 ff.).

Cyllometra manca (P. H. Carp.).

Fig. 66, 67.

Syn.: *Antedon manca* 1888 P. H. Carpenter Chall. Exp. Vol. 26, p. 226.

Cyllometra manca 1907 A. H. Clark Smiths Misc. Coll. Vol. 50, p. 357; 1912 Crin. Ind. Oc., p. 156; 1913 Smiths. Misc. Coll. Vol. 61: 15, p. 34; 1915 Monograph p. 89, 374; 1918 Siboga Exp. Vol. 42 B, p. 116.

From St. 19: 1 specimen.

♂ *Sp. 1* Cd large, discoidal, free dorsal pole 2,8 mm. C. XXIII 23—25; 10—11 mm. in two whorls. All segments are shorter than long.

the proximal ones are longest, L = 3/4 br. From the 6th segment a double dorsal spine, which at the 15th(—17th) segment becomes a single one, h = 1/4 of the br of the segment. The paired prominences distinct, close to one another, only on the 6th—9th segment indistinct, almost forming a transverse ridge. The antepenultimate and the nearest preceding segments with weaker spines. Opposing spine h = 1/2 of the br of the segment. Terminal claw coarse, somewhat curved, about as long as the preceding segment.

R—s narrow bands. I Br 1 free laterally, h = 1/4 br (br = 0,8 mm). I Brax h = 2/3 br, as II Br 2 with a slight synarthrial tubercle. Primipostaxillaries united inside. II Br—s : 2. No III Br—s. II Br 1 h = 1/3—1/2 × br (narrower on the inner side, broader on the outer side). Arms XIX, 50 mm. smooth. After Br 7 oblique segments. Distal segments triangular with slightly swollen articulations. Syzygies: 3 + 4, 15 + 16 or 18 + 19, distally with an interval of 7—10 (usually 9—10) oblique articulations. 18 segments per cm. (16, if the syzygial pairs are counted as units).

P_1 12; 4 mm. Is occasionally missing on the inner side of a II Brax. P_2 14; 7 mm., outer segments with spiny collars, P_3 12; 4,5 mm., P_4 11; 4 mm., P_a is most often absent, P_b 12; 5,5 mm., P_c shorter. P_2 and P_b very much coarser than the other pinnules, longest segments L = 2 br, somewhat angular and spiny. The other pinnules with smooth segments. Distal p. 14—17; 4,5—6 mm. Disk thrown off. Colour yellow with black-red spots.

Example of the distribution of pinnules and division of arms.

$$I\ 1\text{—}2 \begin{cases} II\ 1\text{—}2 \begin{cases} Br\ 1\text{—}\bar{2}\ 3+4\ 5\ 6\ 7\ \ldots \\ Br\ 1\text{—}2\ 3\ 4\ 5+\bar{6}\ 7\ \ldots \end{cases} \\ II\ 1\text{—}2 \begin{cases} Br\ 1\text{—}\bar{2}\ 3+\underline{4}\ \bar{5}\ \underline{6}\ 7\ \ldots \\ Br\ 1\text{—}\underline{2}\ 3+\bar{4}\ \underline{5}\ \bar{6}\ \underline{7}\ \ldots \end{cases} \end{cases}$$

In this as in the following species the specimens that are found in the collection have the double prominences of the cirrals not very distinctly marked.

Cyllometra albopurpurea A. H. Clark.

Fig. 64, 65.

Syn.: *Cyllometra albopurpurea* 1908 A. H. Clark Proc. U. S. Nat. Mus. Vol. 34, p. 239; 1912 Crin. Ind. Oc, p. 158; 1913 Smiths. Misc. Coll. Vol. 61 : 15, p. 34; Wash. Proc. U. S. Nat. Mus. Vol. 43, p. 400; 1915 Monograph pp. 54, 289; Journ. Acad. Sci. Vol. 5, p. 214; 1918 Siboga Exp. Vol. 42 B, p. 115.

Cyllometra manca 1907 H. L. Clark Bull. Mus. Comp. Zool. Vol. 51, p. 289 (according to A. H. Clark 1915 Monograph p. 54 = *albopurpurea*).

From St. 53 (2), 59 (2) = 4 specimens.

Sp. 1 (St. 59) Cd discoidal, 4,5 mm., free dorsal surface 3 mm., h = 1,8 mm. C. XXIX 31—35; 19—21 mm., 3d and 4th segments cubical, 5th—9th slightly longer, then shorter segments again, 10th—12th segments with a dorsal transverse ridge, 13th—16th with a 3—pointed prominence, 16th—24th with a double spine then a single dorsal spine. The double prominences sometimes not distinctly separated. Dorsal spine very small, but in side view well bounded, fixed at the middle of the cirral, h = 1/5 of the br of the segment. Opposing spine considerably larger h = 1/2—2/3 of the br of the segment. Terminal claw pointed, curved, about as long as the preceding segment.

R—s projecting under the margin of Cd. I Br 1 h = 1/6 br, laterally free. I Brax h = 1/2 br, the lateral sides bent at a slight angle to the preceding ossicle. A well-developed synarthrial tubercle between I Br 1 and 2. II and III Br—s : 2, the later ones on the outer sides. Arms XXVI, broken (probably XXVIII in a complete specimen). Ex. of syzygies: 3 + 4, 18 + 19, distally with an interval of (6—)9 oblique articulations. Arms smooth, after Br 9 oblique joints.

P_1 17; 6 mm., (P_1 on Br 2 from the inner side of a II Brax: 14; 6 mm.), P_2 17—18; 9,5 mm., P_3 16–18; 7—8 mm. The distal segments of P_2 and P_3 very long, L = 3 br), in the distal margin serrate. P_a lacking, $P_b = P_2$. P_1 usually absent on the inner side after a III Brax. Distal p. + 20; 7 mm.

Disk very much incised, smallest diameter 4, largest one 10 mm. Colour: red-violet with yellow longitudinal bands. Distally with yellow and red spots mingled.

Example of division of arms and distribution of pinnules:

$$
\text{I } 1\text{—}2\begin{cases}\text{II } 1\text{—}2\begin{cases}\text{III } 1\text{—}2\begin{cases}\text{B } 1\text{—}2\ 3{+}4\ 5\ \underline{6}\ 7\ \ldots\\ \text{Br } 1\text{—}2\ 3{+}4\ \underline{5}\ \overline{6}\ \underline{7}\ \ldots\end{cases}\\ \text{Br } 1\text{—}\underline{2}\ 3{+}4\ \underline{5}\ \overline{6}\ \underline{7}\end{cases}\\ \text{II } 1\text{—}2\begin{cases}\text{Br } 1\text{—}\overline{2}\ 3{+}4\ \overline{5}\ \underline{6}\ 7\ \ldots\\ \text{III } 1\text{—}2\begin{cases}\text{Br } 1\text{—}2\ 3{+}4\ 5\ 6\ 7\ \ldots\\ \text{Br } 1\text{—}\underline{2}\ 3{+}\ 4\ \underline{5}\ \overline{6}\ \underline{7}\ \ldots\end{cases}\end{cases}\end{cases}
$$

Sp. 2 (St. 59) Free dorsal pole of Cd 2 mm. C. XXV 25—31; 15—20 mm. Usually a single dorsal spine from the 16th segment. The middle prominence larger on the proximal segments.

R—s projecting in the corners. I Br 1 h = 1/4 br. The division-series of rather uniform thickness. Arms XVI (possibly two more), broken. II and III Br—s : 2.

P_1 14—16; 5,5—6 mm. (missing in cases comparable with those in the above-quoted scheme). All the ossicles after Br 3 broken. Disk thrown off. Colour: light brown.

Sp. 3 (St. 53) A young specimen, like the following one. C. XIV 9; 2 mm. No dorsal spine, the ends of the cirrals somewhat swollen. Opposing spine h = 1/2 of the br of the segment. Terminal claw a little longer than the preceding segment. Cirral 3 and 4 L = 2 br.

R—s h = 1/2 br. I Br 1 h = br. Axillary h = 1 1/2 br, forming a slight synarthrial tubercle with the preceding ossicle. Arms X, 13 mm.

P_1 10+; 1,5 mm. P_2—P_5 wanting. Disk not incised, 1,3 mm.

Sp. 4 (St. 53) C. XVI 9—11, in a single or partly double whorl.

Arms XIII, 15 mm.+. II Br – s : 2. Syzygies with an interval of 4—5 oblique articulations. The segment very much hour-glass-shaped.

P_1 14; 3,5 mm., P_2 13; 2,5 mm. Disk incised, dark-red.

The young of this genus seem to have longer proximal brachials (I Br 1 and 2 especially longer) than other young forms I have examined.

The cirri in sp. 1 somewhat resemble *C. manca* and so there might be some doubt whether the two species are distinguishable (Sp. 1 corresponds in all the other characteristics with sp. 2, which is a younger individual of the same type, but with pronounced *albopur-*

purea-cirri). Nevertheless certain differences might be given which speak in favour of the preservation of the species *albopurpurea*. *C. manca* in the above-described specimen has 25 cirrals at a cirrus-length of 11 mm; the cirrals are shorter than long; *C. albopurpurea* does not have the same number of cirrals until a cirrus-length of 15 mm.: the proximal cirrals are longer than broad. Both the species during their evolution show a tendency towards short cirrals, but reach this stage at different cirrus-lengths. The characteristic dorsal spine of *C. albopurpurea* (and *gracilis*) is, in a somewhat similar form, to be found in the above-described young stage, referred with some doubt to *C. disciformis*.

As to the young stages it may be noted that young forms of *C. albopurpurea* have more than X arms already at an arm-length of about 15 mm., when the brachials are still very juvenile, long, and strongly hour-glass-shaped. The young of *C. disciformis* even at an arm-length of 25 mm. has X arms and rather smooth brachials.

Cyllometra pulchella n. sp.

Fig. 133—140. Photo 9.

From St. 6 (7), 12 (1), 13 (33), 16 (2), 17 (3) = 46 specimens.

Sp. 1 (St. 13) Cd thickly discoidal, the free, flat, dorsal surface 1,5 mm. C. XXIV 25—29; 10—12 mm. in two whorls. 1st—3d segment shorter than broad, 4th about cubical, 5th somewhat longer, the following ones L about 1 1/3 br. Antepenultimate segment a little longer than broad. From about the 7th segment a slight dorsal transverse carination, at the 12th or 14th segment a little thickened on both sides of the median line, appearing there as two inconspicuous tubercles (visible only by high magnification); from the 15th or 20th segment a single swelling which disappears again on the outermost cirrals. Penultimate segment about as long as broad, with an opposing spine, h = 1/3—1/2 of the br of the segment. Terminal claw pointed, curved, 1 1/2 times as long as the preceding segment.

R—s very narrow bands, laterally united in the proximal half. I Br—s 1 laterally free, h = 1/3—1/4 × br. I Brax pentagonal, h = 2/3 br, forms vid I Br 1 a small synarthrial prominence with an indis-

tinctly limited tubercle, not at all or only slightly prominent in lateral view. Br 1 and 2 with a similar though still smaller prominence. Br—s inwardly united basally: Ex. of syzygies: 3 + 4, 9 + 10, 14 + 15 etc. with an interval of 3 (exceptionally only 2) oblique articulations. Arms X, 40—45 mm. First 10 Br—s discoidal, not »wall-sided», then oblique joints. Arms smooth.

P_1 13—15; 3—5 mm. (The pinnulars smooth, cubical to L = 1 1/2 × br), P_2 16; 5—6,5 mm., longer and stouter than the preceding pinnule, the middle segments often with small, distal tubercles, P_3 12; 3—4 mm. as the following ones smooth; P_4 13; of the same length or shorter. P_5 and the following pinnules again longer. P_a absent, P_b 14; 4,5 mm. Distal p-s ± 20; 5 mm. (1st and 2d segments short, 3d cubical, the following pinnulars long and slender, L about = 2 br).

Disk incised, smooth, without calcareous granules, 3 mm. — Colour light-brown (in the preserved animal).

Sp. 2 (St. 13) Cd knob-formed, free dorsal surface 1,3 mm. Terminal claw about as long as the penultimate segment. — Axillary a low hexagon, h = 2/3 br. II Br—s : 2. Syzygies with an interval of 2—3 oblique articulations. Br 1—8 discoidal. — Distal p—s with a notch between the 2d and 3d segment (a similar condition though not so decided in Sp. 1 too) by which the 2d segment seems to form a small prominence. For further details as in the following specimens cf. the table.

Sp. 3 (St. 13) The distal pinnules as above. *Sp. 4* and *Sp. 5* (St. 13) —.

Sp. 6 (St. 13) All the cirri with the exception of a young one, broken. Some arms with widely separated syzygies. Example:

I 1—2 { Br 1—2 3 + 4 . . . . 16 + 17 . . . 20 + 21 . . . 27 + 28 . . . 33 + 34 . . .
II 1—2 { Br 1—2 3 + 4 . . . . . 23 + 24 . . . 28 + 29 . . . 34 + 35 . . .
Br 1—2 3 + 4 . . 18 + 19 . . . . 26 + 27 . . 33 + 34 . . 40 + 41 .

or I 1—2 { Br 1—2 3 + 4 . . . 9 + 10 . . . 14 + 15 . . . 23 + 24 . . .
Br 1—2 3 + 4 . . . . . 15 + 16 . . . 22 + 23 . . .

All the other specimens with normal distribution of syzygies. Colour of the specimen : whitish with red spots.

Sp. 7, Sp. 8 and *Sp. 9* (St. 13) —.

Sp. 10 (St. 13) P_a in one case present (10 segments); L = 2,2 mm.

Sp. 11 (St. 13) P_a in one case present = the preceding specimen.

Sp. 12 (St. 13) —.

Sp. 13—28 (St. 13) P_a exceptionally present. P_1 in rare cases lacking on a Br 2, when this ossicle stands on the inner side of a II Brax. Arms X : 7 cases, XI : 3 cases, XII: 3 cases, XIII : 1 case, XIV : 1 case, XV : 1 case.

Sp. 29—33 (St. 13) not examined.

Sp. 34 (St. 6) The free dorsal surface of Cd 2 mm. Syzygies with an interval of 3—4 oblique articulations distally. P_1 about = P_2.

Sp. 35 (St. 6) P_c 12; 4 mm. Colour, as in most of the preceding specimens, yellowish, with small, sparse, crimson spots here and there. Disk thrown off.

Sp. 36 and 37 (St. 6) Syzygies with an interval of 3 oblique articulations. Colour as in Sp. 35.

Sp 38 (St. 6) In arms situated on II Brax ex. of syzygies: 3 + 4, 13 + 14, 18 + 19 . . etc. with an interval of only two oblique articulations. The proximal pinnules on the distal side slightly carinated. Disk thrown off. Colour (as in Sp. 39—43) more uniformly yellowish (in formol-spirit).

Sp. 39 (St. 6) Syzygies with an interval of 3—4 oblique articulations.

Sp. 40 (St. 6) Syzygies with an interval of 2—3 oblique articulations. The segments are rather long, juvenile. P_2 relatively small.

Sp. 41 (St. 12) Cirri in a single or double whorl. R—s broad bands. I Br 1 h = 1/2 br. No synarthrial tubercle.

Sp. 42 and Sp. 43 (St. 16) R—s appearing as narrow bands.

Sp. 44 (St. 17) Disk 4 mm. Colour as in the preceding specimens tigered (white, with small, rather sparse violet spots).

Sp. 45 and Sp. 46 (St. 17) Arms X, 28 and 32 mm. respectively.

A comparison of the number of arms shows the following distribution: X arms: 15 cases, XI: 8 cases, XII: 10 cases, XIII: 5 cases, XIV: 1 case, XV: 2 cases. Here, as in *Astenometra anthus*, one can observe the condition that it is not always the largest specimens that

Number of Specimens and Stations	Cirri			Arms		P_1		P_a	P_2		P_b		P_3		P_4		Distal p.	
	N	S	L	N	L	S	L		S	L	S	L	S	L	S	L	S	L
Sp. 1 (St. 13)	XXIV	25—29	10—12	X	40—45	13—15	3—5	—	16	5—6,5	14	4,5	12	3—4	13	+ 3,5	+ 20	5
Sp. 2 (St. 13)	XXVI	20—24	8—10	XII	40	12	3,5	—	13—14	5	14	5	10	3,5	12	3	+ 15	4,5
Sp. 3 (St. 13)	XXVII	19—22	+ 9	XI	40	11	3	—	13	3,5—4,5	14	5	11	2,5	9	2	16	5,5
Sp. 4 (St. 13)	XXIV	21—22	9	XII	45	14	4	—	17	6	16	5,5	13	4	—	—	+ 18	5
Sp. 5 (St. 13)	XXVIII	19—26	8—11	XI	35	13	3	—	16	5,5	14	4	12—14	3,5—4	11	2,5	+ 18	4,5
Sp. 6 (St. 13)	XXVII	27	7	XII	40	12	2,5		12	4	12	3,5	11	2,5	-	—	14—18	3,5—5
Sp. 7 (St. 13)	XXVII	18—25	6—11	XII	35	12	3,2	-	12	5	13	4,2	12	4	13	2,7	16	5
Sp. 8 (St 13)	XXIV	20—23	8—9	XI	35	11	3		13	4,7	12	4	11	2,5	12	2,2	17	5
Sp. 9 (St. 13)	XXV	18—23	7- 9	XIII	40	13	3,5	—	17	6	15	5,5	14	3	13	2,7	18	5
Sp. 10 (St. 13)	XXXI	19- 25	7—11	XI	40	13	3,5	×	16	6	15	5	11	3,5	10	2,5	—	—
Sp. 11 (St. 13)	XXI	20—21	8	XII	25	11	2,5	×	14	4,5	10	3	10	2,2	—	—	-	—
Sp. 12 (St. 13)	XXIV	20 25	7—9	X	33	12	3,5	—	16 18	7	13	5	12	3,5	13	3		—
Sp. 34 (St. 6)	XXVIII	22—26	9	XIII	45	10	3		14	5,5	—	-	10	3	10—12	2—3	+ 18	5
Sp. 35 (St. 6)	XXV	19—25	10—11	X	45	12—13	3,5	- -	13	5,5	14	5,5	12	4	10- 12	2,5—3	+ 20	5,5
Sp. 36 (St. 6)	XXIX	19—23	8—10	XII	45	11	3	—	15	5	13	4,7	10	2,5	10	2,3	18	4,5
Sp. 37 (St. 6)	XXVII	18—27	7—11	X	52	11	3,2	—	16	5	13	4,5	11	3	11	2,7	+ 18	5
Sp. 38 (St. 6)	XXVIII	19—22	7—9	XIII	30	12	3,3	—	15	6	12	5	11	3	12	2,5	+ 18	5
Sp. 39 (St. 6)	XXIV	18—22	7—9	X	40	10	3	—	15	5,5	10	3,7	10	2,5	10	2,2	21	5
Sp. 40 (St. 6)	XXI	16—19	5—7	XV	25	10	3	—	11	4	+ 9	2,2	9	2	—		+ 15	3,5
Sp. 41 (St. 12)	XVII	20 24	8—10	XII	40	9—10	3	—	-	+ 4	9	4	9	2,5	-	-	+ 14	4
Sp. 42 (St. 16)	XX	18—24	8—12	XI	45	10	3,5	-	15	5,5	13	4,7	12	4	11	2,5	18—19	6
Sp. 43 (St. 16)	XXVI	20—25	7—8	XIII	30	10	2,8	- -	13	4	10	2,5	9	3	11	2	+ 18	5,5
Sp. 44 (St, 17)	XVIII	(12) 20-23	7—8	X	35	10	3	—	14	4,5	—	—	12	3	—	—	—	—

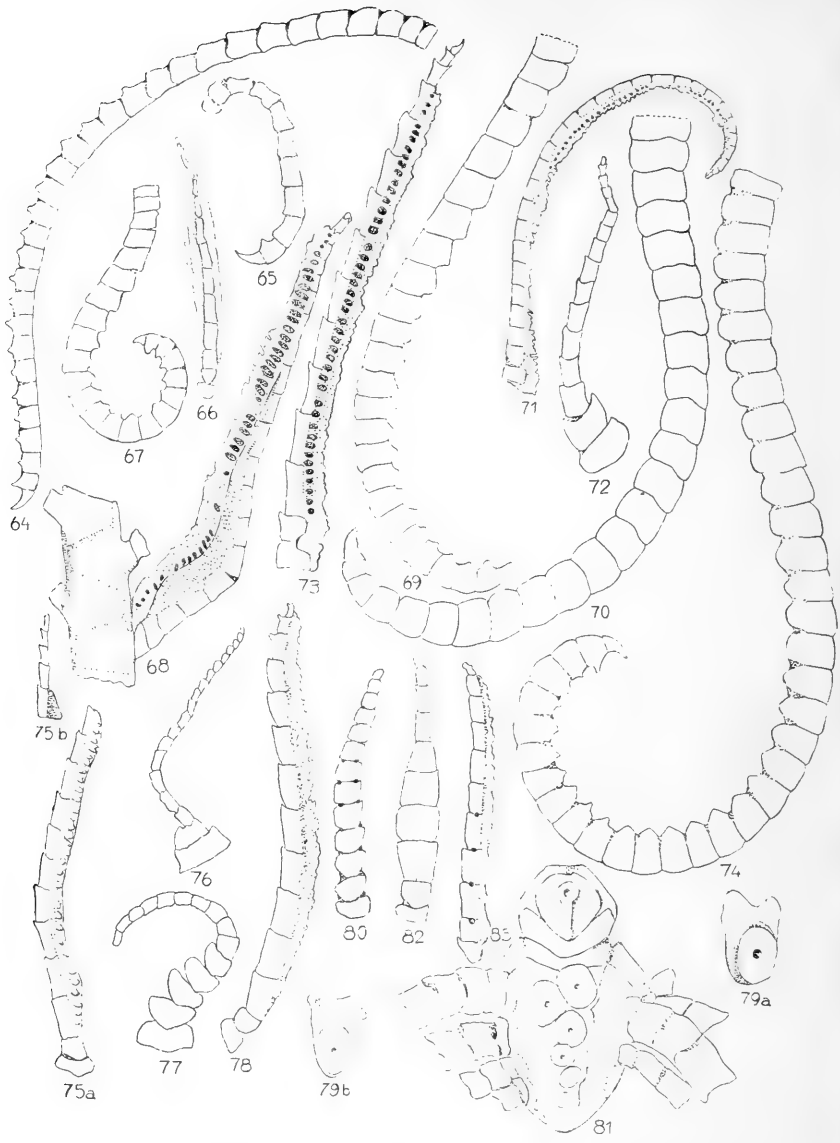

Fig. 64. 65. *Cyllometra alhopurpurea* 64) Large cirrus (St. 59) $^{7}/_{1}$, 65) Cirrus from a young specimen (St. 53 Sp. 4) $^{14}/_{1}$; 66, 67 *Cyllometra manca* (St. 19) 66) Distal pinnule $^{14}/_{1}$, 67) Cirrus $^{9}/_{1}$;

have the most arms, but rather the reverse. It is probable, as I have suggested when treating the above-mentioned species, that the question of catching the food plays a certain rôle, but possibly (though not very likely, cosidering that I have often seen »duplicative» regenerates situated on Br 1, but never a single arm regenerated from the same ossicle) one might also connect the phenomenon with the fact that the family *Colobometridæ* strongly tends to a X-armed type and that this is reached only after a transition stage with more than X arms.

By the small transverse carination (on some segments replaced by a pair of microscopic tubercles) on the proximal cirrals the new species proves itself to be a form of an *Oligophreat* type, though otherwise it presents much that reminds us of certain *Perometrins* (the relatively large size of the centrodorsal cavity and the position of the rosette, which only radially forms »spout-like» processes).

The new species approaches most to *C. manca,* from which it differs by a smaller and less discoidal Cd, by longer cirrals, which have only inconspicuous carinations, by the absence of III Br—s, by the short interval between the syzygies, and by P_2 being almost smooth.

The species is an interesting form, showing a strong tendency of convergence towards the Macrophreat type.

68, 69 ***Cyllometra disciformis*** (St. 35) 68) Arm-stump with a genital pinnule $^{14}/_{1}$. 69) Cirrus $^{9}/_{1}$; 70, 71 ***Tropiometra encrinus*** (St. 45), 70) Cirrus $^{9}/_{1}$. 71) Distal pinnule $^{9}/_{1}$; 72, 73 ***Pectinometra flavopurpurea*** 72) P_1 $^{14}/_{1}$, 73) Distal pinnule (4—5 pairs of Sacculi per segment) $^{14}/_{1}$; 74) ***Cenometra bella*** Cirrus $^{9}/_{1}$; 75, 76 ***Xenometra multicolor*** (St. 12), 75 a) Distal pinnule (the tip broken) $^{14}/_{1}$, b) The tip of the pinnule from another specimen (in Dr Mortensen's collection) $^{14}/_{1}$, 76) P_1 $^{14}/_{1}$; 77, 78 ***Crossometra septentrionalis*** (St. 36), 77) PII (the 7 last segments broken) $^{14}/_{1}$, 78) Distal pinnule $^{14}/_{1}$; 79—83 ***Diodontometra Bocki*** (St. 56) 79 a) The penultimate segment viewed from the proximal end. b) The same segment viewed from the distal end. × 17 $^{1}/_{2}$. 80) P_1 $^{14}/_{1}$, 81) Cd with the cirri arranged in radial groups (observe the distal face of I Br 1) $^{9}/_{1}$, 82) Genital pinnule $^{14}/_{1}$, 83) Distal pinnule $^{14}/_{1}$.

Tropiometridæ A. H. Clark.

Tropiometra A. H. Clark.

Tr. afra var. macrodiscus (Hara).

Syn.: *Antedon macrodiscus* 1895 Hara Zool. Mag. Tokyo Vol. 7, p. 115.

Tropiometra macrodiscus 1907 A. H. Clark Smiths. Misc. Coll. Vol. 50, p. 349; 1908 H. L. Clark Bull. Mus. Comp. Zool. Vol. 51 (N:o 11), p. 279; 1912 A. H. Clark Smiths. Misc. Coll. Vol. 60, N:o 10, p. 28; 1915 Journ. Acad. Sci. Vol. 5, p. 214; Monograph pp. 52, 54, 275; 1918 Siboga Exp. Vol. 42 B, p. 131.

Tropiometra afra (part) 1908 A. H. Clark Proc. U. S. Nat. Mus. Vol. 34, p. 315; 1912 Crin. Ind. Oc., p. 176.

From St. 27 = 9 specimens.

Sp. 1 (St. 27) Cd discoidal, flat dorsal surface with slight radiating swellings, 10 mm.

C. XLIII 36—39, ± 40 mm. in two whorls. The segments are uniform, cubical or somewhat (L = 1/2 — 2/3 br) shorter. No dorsal spine. Terminal claw a little longer than the penultimate segment. Cirri coarse. Ventral cirri shortest and with a less number of segments.

R—s somewhat projecting in the corners. I Br 1 h = 1/6 br, laterally grown together as are also the bases of the axillaries. The articulations between the proximal ossicles indistinct. I Br 2 h = 1/3 br, pentagonal or almost triangular with a small median tubercle well marked off from I Br 1. The proximal segments flattened, granular, as is often the case in *Oligometrides*. Arms X, 190—210 mm. Br 1 united inside in pairs, their br 5,5 mm. Br 1 and 2 on the outer side twice as long. All the distal segments short, discoidal. Ex. of syzygies: 3 + 4, 8 + 9, 13 + 14, 30 + 31, 39 + 40, 50 + 51 or 3 + 4, 9 + 10, 15 + 16, 28 + 29, 41 + 42, 51 + 52... Distally with an interval of about 8 oblique articulations. The L of the segments = 1/4 br. 14 segments per cm. (12, if the syzygial pairs are counted as units).

P_1 25—27; 20 mm., P_2 34; 26 mm. (L. of the segments = 1 1/2 br). P_2—P_{10} slowly decreasing, larger and coarser than the following pinnules. Ambulacral furrow does not appear until P_9(—P_{11}) (with the exception of on an arm shorter than the other ones). Distal p. ± 35; 15

mm. (3—5 last segments with weak dorsal hooks, the other segments L = 1 1/2 — 2 br).

Disk 22 mm. Mouth subcentral. Anal cone 5 mm. Colour: dark chocolate violet.

Sp. 2 (St. 27) P_1—P_{11} without ambulacral furrow. For further details see the table.

Sp. 3 (St. 27) P_1—P_{10} without ambulacral furrow.

Sp. 4 (St. 27) P_3 28; 22 mm. P_1—P_4 or P_7 without ambulacral furrow. Example of distribution of syzygies: 3 + 4, 9 + 10, 18 + 19, 28 + 29, 36 + 37, 42 + 43, 48 + 49, 54 + 55, 59 + 60, 69 + 70, 77 + 78, 82 + 83, 99 + 100 . .

Sp. 5 (St. 27) P_1—P_5 or P_8 without ambulacral furrow. Disk 26 mm.

Sp. 6 (St. 27) P_3 33, 23 mm. P_1—P_{11} or P_{16} without ambulacral furrow. Disk 25 mm.

Number of specimen	Cirri			Length of arms	P_1		P_2		Dist. p.		Diam. of dorsal pole of Cd
	N	S	L		S	L	S	L	S	L	
Sp. 1	XLIII	36—39	± 40	190—210	25-27	20	34	26	± 35	15	10 mm.
Sp. 2	XXX	34—40	30—50	150—180	± 30	22	± 30	—	± 30	14	5
Sp. 3	XLV	34—38	32—42	130—250	34	26	42	30	40-45	16-18	7
Sp. 4	XXXVI	37—40	35—42	—	24-28	24	33	27	± 35	15	7
Sp. 5	XXXIII	36—41	30—40	120—180	34	21	32	21	35	14	9
Sp. 6	XXXIV	38—40	± 40	150—220	26	18	30	23	33	12	6
Sp. 7	L	33—38	35—45	180—240	35	23	25 +	—	37-40	18	7
Sp. 8	XLIII	28—40	30—50	245—265	33-42	25-30	± 35	25-30	36	18	9
Sp. 9	XXXVI	28—39	38—45	190—215	27	18	± 30	21	32	18	7,5

Sp. 7 (St. 27) P_3 38; 30 mm. P_1—P_9 or P_{11} without ambulacral furrow.

Sp. 8 (St. 27) Diameter of Cd 12 mm. Some cirri with a slight opposing spine. In the pharynx a couple of very large *Myzostomas*. P_1—P_8 without ambulacral furrow. Disk 29 mm.

Sp. 9 (St. 27) P_1—P_9(—P_{11}) without ambulacral furrow. Disk 24 mm.

The relative size of the proximal pinnules is very variable. P_1 is, however, always more slender because of the lack of a gonad.

Tropiometra afra macrodiscus differs according to A. H. Clark from *Tr. afra* by the presence of longer and coarser cirri which have more cirrals. This difference is also to be found in those that

were brought home by the Bockian expedition. Nevertheless I cannot consider that a form that only differs in a characteristic of such a low systematic value as this is to be counted as more than a variety. Besides one must bear in mind that *Tr. macrodiscus* is only known from Sagami Bay, while *Tr. afra* is known from the coasts of Africa, Australia and New Guinea. Therefore it is very probable that transition forms may be brought home from the intervening territory. Compare also A. H. Clark's own descriptions of specimens from Sagami (Proc. U. S. Nat. Mus. Vol. 34, p. 315), which are not very different from *Tr. afra*. Accordingly I am of the opinion that the differences of *Tr. macrodiscus* certainly cannot be given more than the value of those of a variety.

Tropiometra encrinus (Lütken).

Fig. 70, 71.

For the older synonymy see 1912 A. H. Clark Crin. Ind. Oc. p. 177 pro parte (only specimens east of India belonging to this species).

Tropiometra encrinus 1911 A. H. Clark Austral. Mus. Mem. Vol. 4, part 15, p. 780; (?) Fauna Süd-West Austr. Bd 3, Lief. 13, p. 440; 1912 Rec. Ind. Mus. Vol. 7, p. 270, (?) Smiths. Misc. Coll. Vol. 60: 10, p. 29; 1913 Proc. U. S. Nat. Mus. Vol. 43, p. 402; 1914 A. Reichensperger Crin. Aru u. Kei-Inseln, Senckenbg. Vol. 35, p. 106; 1915 A. H. Clark Monograph pp.; 1918 Siboga Exp. Vol. 42 B, p. 131.

From St. 45: 1 specimen.

Sp. 1 Cd flattened, free dorsal pole 2 mm., with indistinct scars after fallen cirri. — C. XX 25—29 (one cirrus regenerated from the 11th segment), 18—24 mm. in two whorls. Cirrals uniform L = 1/2 — (distally) 2/3 br, antepenultimate segment L = br. Opposing spine an indistinct prominence. Terminal claw L = 1 1/2 × the preceding segment, curved, pointed.

R—s h = 1/4 br, broadest in the corners. I Br 1 h = 1/3 br, laterally free. Axillary triangular h = 1/3 br. Arms X, 105 mm. Br 1: br 2,7 mm., united inside in pairs to 1/3 of their height, on the outside twice as long like Br 2. Example of syzygies: 3 + 4, 8 + 9 (or 9 + 10), 16 + 17, distally with an interval of 5 to 9 oblique articulations. The brachials distally somewhat overlapping, giving the distal parts of the arms a somewhat serrate profile. The proximal arm-parts smooth, a little

flattened. I Brachials laterally with a sharp edge, never a mediodorsal carination. 15 segments per cm. (12—13, if the syzygial pairs are counted as units).

P_1 24—25; 12,5 mm. smooth, 2d—4th segment with a slight keel on the side which faces the distal parts of the arms, P_2 similar, P_3 25, 12 mm. P_5 21; 11 mm. P_8 23; 8 mm. P_1—P_5 without ambulacral furrows, larger and coarser than the other pinnules, with gonads. Nevertheless not so marked as in *Tr. afra macrodiscus*. Distal p. $\pm$ 30; 14 mm. (1st to 2d or 3d segment short, then $L = 1^1/_2 - 2 \times br$). Disk 13 mm. Colour: red-violet.

I have kept this *Tr. encrinus* as a species, though it is obvious that intermediate forms are to be found in territories between the region of distribution of *Tr. carinata* and that of *Tr. encrinus*. According to A. H. Clark (Siboga Exp. Vol. 42 B) *Tr. encrinus* is said to be restricted to the territories east of India, *Tr. carinata* to occur west of this peninsula. In Crinoids of the Indian Ocean (1912) he is not of the same opinion. In this work he certainly separates *Tr. carinata* from *encrinus*, but of *Tr. encrinus* he says that it appears to the westward to Aden, the Red Sea etc. About the cirrals he states that: »the outer segments are about twice as broad as long as in *Tr. carinata*». In the Siboga work he distinguishes the species by the distal cirrals, which in the former species are »much less than twice as broad as long» in *Tr. carinata:* »more than twice as broad as long». It may be questioned which distinguishing feature he used in 1912 to keep the two species separate.

Reichensperger (1914 p. 107) states that specimens from Ceylon that he has examined present some variations in the relation between L and br of the cirrals. In a table he has given the cirrus-length and the number of cirrals of the different specimens, but his assertion that one »aus einem Vergleich der Gliederzahlreihe mit der Cirrenlänge ohne weiteres einsieht» that the relation between L and br of the cirrals varies is not, however, quite correct. The proportions between L and br might have been the same even if the number of circals and length of cirri has varied, for the coaseness of the cirrus is also subject to variability.

Reichensperger's second criterion of the identity of the two species (that P. H. Carpenter has described a young specimen from Bahia

with longer cirrals) shows nothing, for, as is well known, all young Crinoids have longer cirrals. As a general opinion one may say that the difference given by Clark 1918 seems to be the only distinguishing feature, but that it is probable that the difference is only a function of different geographical and ecological factors. Here, as always, one has, however, also to keep in mind the probability of hybridisation between two separate forms, which would give intermediate forms in the transition territory. Such intermediate forms are, according to Reichensperger, found at Ceylon, but whether they are caused by geographical factors or by hybridisation cannot yet be determined.

Calometridæ A. H. Clark.

Neometra A. H. Clark.

N. multicolor A. H. Clark.

Fig. 75, 76.

Syn.: *Antedon discoidea* (part) 1906 Mc Clendon Bull. Amer. Mus. Vol. 22, pp. 120, 125, 126 according to A. H. Clark.

Antedon multicolor 1907 A. H. Clark Proc. U. S. Nat. Mus. Vol. 33, p. 130.

Antedon thetis 1907 A. H. Clark Proc. U. S. Nat. Mus. Vol. 33, p. 151.

Calometra multicolor 1907 A. H. Clark Smiths. Misc. Coll. Vol. 50, p. 363.

Neometra multicolor 1912 A. H. Clark Crin. Ind. Oc. p. 183; Smiths. Misc. Coll. Vol. 60: 10, p. 29; 1915 Monograph pp. 67, 329, 363; Wash. Journ. Acad. Sci. Vol. 5, p. 214; 1918 Siboga Exp. Vol. 42 B, p. 133.

From St. 12 = 2 young specimens.

Sp. 1 (St. 12) Cd slightly arched, dorsally flattened, 1,5 mm., C. XII 27—30; 11 mm. in a thin whorl. 1st segment short, 2d cubical, 3d a little longer, 4th and the following ones L = 1 1/2 br, distally shorter. The distal parts of the cirrals from the 5th segment somewhat collar-shaped and bent outwards. Dorsal spine single, from about the 15th segment. Opposing spine h = 1/2 of the br of the segment. Terminal claw curved, shorter than the penultimate segment.

R—s h = 1/4 br, IR prolonged to tips which separate I Br 1 laterally. I Br 1 h = 1/3 br, widely spread out from each other, provided with slight lateral prominences and an inconspicuous medio-dorsal list

(as is also the case in the preceding and following ossicle). Between I Br 1 and 2 a close articulation. Axillary h = 3/4 br. without a lateral flange. II Br—s: 2. Arms XII, 30 mm. Primipostaxillaries basally united inside. Br 2 on the outside twice as broad than on the inside.

Ex. of syzygies: 3 + 4, 12 + 13, 17 + 18, 21 + 22 . . etc. with an interval of 3 to 4 oblique articulations.

P_1 19; 4,5 mm. (the 2 first segments strongly enlarged. 1st segment h = 1/3 br with a wing which is broader than the br of the segment, 2d segment h = 1/2 br with a smaller wing, the following segments slender h = 1 1/2 br, rather smooth, though angular). P_2 17; 7 mm. coarser than P_1 (1st and 2d segments as in P_1 but more slightly alated, 3d and the following segments L = 3 — 4 × br, distal segments shorter, with small distal, spiny whorls). P_3 10; 5 mm. (only the 1st segment with a wing). A wing on the 1st segment more and more inconspicuous out to P_{10} or P_{15}. Distal p. 15; 7 mm. (1st and 2d segment a little enlarged L = 1/2 — 1/1 br, 3d and following segments L = 2 — 2 1/2 br. Last 4 segments shorter and more delicate, with distal, spiny whorls). Disk thrown off. Ectoparasitical *Eulima*.

Sp. 2 (St. 12) C. X 28—31, ± 11 mm. A dorsal spine from the 12th segment.

The R—s IR projecting. The carination on I Br 1 and 2 very slight and indistinct. Arms X, 32 mm. Syzygies: 3 + 4, 9 + 10, 13 + 14 etc. with an interval of 3 oblique articulations.

P_1 21; 5 mm. P_2 14 +; 6 mm., P_3 13; 4,7 mm. Distal p. 13 +; 6 mm.

Disk thrown off. — The specimen sticking to an *Acanthogorgia Dofleni* Kükth. & Gorz.

The description evidently corresponds on the whole to A. H. Clark's description of *Antedon thetis* which is a young form of *N. multicolor*. A characteristic in which specimen 1 differs from both the Clarkian descriptions, is a slight medio-dorsal carination of the radials and the I Br series.

Possibly the original Clarkian opinion that *Calometra* and *Neometra* ought to be united in one genus is the right one. The difference between the two genera, namely that P_1 and P_2 in *Calometra* are about as long as the following pinnules, in *Neometra* considerably longer, scarcely holds good (see the comparison given below).

	P_1	P_2	P_3	P_4	$P_{Dist.}$
C. callista	5 mm.	6—7 mm.	slightly	decreasing	—
N. (C.) diana	10 mm.	13—15 mm.	17 mm.	—	—
N. sibogæ	11—12 mm.	11—12 mm.	15 mm.	11 mm.	—
N alecto	7 mm.	10 mm.	12 mm.	10 mm.	—
N. multicolor	—	much longer than P_1, very variable, usually twice	usually considerably smaller		—
N. spinosissima	10 mm.	a little longer	20 mm.	similar	—
My specimen 1 of *N. mult.*	4,5 mm.	7 mm.	5 mm.	—	7 mm.

When one takes into consideration that the length of P_2 in *N. multicolor,* as stated by Clark, is very variable, I cannot think that the above quoted characteristic can be a genus-separating one. It may be true and applicable to full-grown individuals that the arms are X—XI in *Calometra* but XVI—XL in *Neometra* but this characteristic alone is hardly of genus-separating value. The other distinguishing marks which are given in the diagnosis of the two genera are (with the exception of the one cited below) common to both of them. *Calometra diana* seems to be an interesting intermediate link between *Calometra* and *Neometra.*

In one characteristic, however, both the genera seem to be separated and for the present I have not brought them together. The R—s are of different formation. In *C. callista* the interradial processes from R characteristic of *Neometra* are lacking and I Br-s 1 are therefore in lateral opposition. Judging from the figure given by Carpenter (Chall. Exp.) the R—s in *C. discoidea* also seem to have a similar formation, though an evident approach to the *Neometra* type may be traced (cf. A. H. Clark Smiths. Misc. Coll. Vol. 61: 15, p. 42). It is, however, also to be noted that other *Calometrid* genera (e. g. *Pectinometra*) often have an interradial prominence on the R—s.

Pectinometra A. H. Clark.

P. flavopurpurea A. H. Clark.

Fig. 72. 73.

Syn.: *Antedon discoidea* (part) 1906 Mc Clendon Bull. Amer. Mus. Vol. 22, pp. 120, 125, 126 according to A. H. Clark.

Antedon flavopurpurea 1907 A. H. Clark Proc. U. S. Nat. Mus. Vol. 33, p. 134.

Calometra flavopurpurea 1907 A. H. Clark Smiths. Misc. Coll. Vol. 50, p. 363.

Pectinometra flavopurpurea 1912 A. H. Clark Crin. Ind. Oc., p. 188; 1915 Wash. Journ. Acad. Sci. Vol. 5, p. 215; 1918 Siboga Exp. Vol. 42 B, p. 138.

From St. 34 (5 sp.), 35 (1), 36 (1) = 7 specimens.

Sp. 1 (St. 36) Cd flattened, 2,2 mm., free dorsal pole 1,5 mm. C. XIX 21—24 (D) 25—27 (V), 9—12 mm. in two whorls, arranged in 10 rows. 4th segment a little longer than broad, 5th and 6th longest, L = 1 1/4 br, then shorter again, distally L = 1/2 br. From the 7th segment a dorsal spine, compressed from the sides and therefore crista-shaped, distally shortened to a spine. Opposing spine similar to the preceding ones, h = 1/3 of the br of the segment. Terminal claw shorter than the penultimate segment.

R—s with a pointed interradial prominence which separates I Br-s 1. These ossicles with a medio-dorsal, slightly two-topped crista and small lateral prominences which meet above the radial processes. I Br 1 h = 1/3 br. I Br 2 h = 1/2 br, in the proximal half a crista continuing this one on I Br 1. II Br-s: 2. Arms XVIII, 50 mm. II Br 1 basally contiguous inside, with a lateral process on the proximal outer margin. A similar though indistinct one on Br 1. II Br 1—2 with an indistinct synartrial prominence. Br 2 twice as narrow on the inside, thickened on the outside to receive P_1. Example of division of arms and distribution of syzygies:

$$\text{I } 1\text{—}2 \begin{cases} \text{II } 1\text{—}2 \begin{cases} \text{Br } 1\text{—}2\ 3+4\ldots13+14\ldots19+20\ldots25+26\ldots \\ \text{Br } 1\text{—}2\ 3+4\ldots12+13\ldots18+19\ldots26+27\ldots \end{cases} \\ \text{Br } 1\text{—}2\ 3{+}4\ldots11{+}12\ldots17{+}18\ldots22{+}23\ldots27{+}28\ldots32{+}33\ldots \end{cases}$$

The segments not overlapping, distally somewhat longer than broad.

P_1 13; + 4 mm. (much more slender than the following p. Two first segments with wing-like processes, 1st segment br = 3 h, 2d one br = $2^1/_2$ h, 3d segment about cubical. Distal segments slender, longer than broad), P_2 10; 4,2 mm. P_3 9; 3,7 mm. P_4 9; 3,8 mm. with still more insignificant wings. Distal p. 15—16; 6,5 mm. (1st and 2d segments short and somewhat swollen, last 3 slender with distal spiny whorls. The other segments smooth, L = 3 — 4 × br). Disk thrown off. Colour (in spirit) yellow-brown, cirri with white and red-grey bands alternating.

Two *Myzostomas* on the pinnules.

Sp. 2 (St. 35) Cd 3 mm, free dorsal pole 2,5 mm. C. XX 25—30; 14—18 mm. arranged in 5 interradial groups, separated by radial interspaces.

R—s not very much IR prolonged. Arms XVII, 65 mm. II Br-s: 2. Br segments about 100. The bases of the arms bent outwards from Cd at almost a right angle. Syzygies with an interval of 4—6(—11) oblique articulations. The segments slightly overlapping and serrate.

P_1 14—15; 4—5,2 mm. (3d segment h = $1^1/_2$ br), P_2 14; 6,8—7 mm. (4^{th}—10^{th} segment L = 2 — $2^1/_2$ br), P_3 13; 6,5 mm. coarser than the two preceding ones, P_4 9 +; 4,7 mm. A wing on the first two segments out to P_7. Distal p. 15—17; 7,5—8 mm. The pinnules are stiff.

Disk 5 mm. with close calcareous granules. Anal cone 2 mm. narrow, with coarse calcareous granules. Colour: arms with yellow and violet bands alternating (= all the following specimens), cirri as in Sp. 1.

Sp. 3 (St. 34) Cd 2,3 mm., free dorsal part 1,8 mm. C. XX 22—31; 9—17 mm., indistinctly separated in groups. R—s with small interradial prominences. Arms XVIII (+ 1?), 75 mm. P_1 18; 5,5 mm., P_2 19; 8 mm., P_3 17; 8,5 mm., P_4 15; 8 mm. Distal p. 15—16; 9—9,5 mm.

Sp. 4 (St. 34) Cd 3,2 mm., free dorsal pole 2,5 mm. C. XXIII 29—33; 14—18 mm. Arms + XX, 85 mm. R—s not very much IR prolonged. 1 Br-s 1 contiguous basally. Syzygies with an interval of (6—)11—14 oblique articulations. — P_1 19 segments, P_2 21; 9,5 mm. P_{10} 13; 6,2 mm. Distal p. 15; 9—9,5 mm.

Sp. 5 (St. 34) Cd 4 mm., bare pole 3 mm. C. XXII 27—37; 17—24 mm. The cirrus-groups IR well separated. 1 Brax almost without median tubercle, h = $^1/_2$ br. Arms ± XX. P_1 22; 7 mm. — Disk coarsely granulated, strongly incised, largest diameter 8 mm., smallest 4 mm.

Sp. 6 (St. 34) C. XXII 25—31; 14—20 mm. Arms + XX, 90 mm. Br-segments about 130, from about Br 100 a slight median carination. Syzygies with an interval of 4—10 oblique articulations. — P_1 18; 5,5 mm. P_2 17; 9,5 mm., P_3 16—17; 8,5—9 mm., P_4 16; 9,5 mm., P_9 13; 6 mm. Distal p. 17; 9—10 mm. — Disk regenerating, 3,5 to 7 mm. in diameter.

Sp. 7 (St. 34) The dorsal, free surface of Cd 2 mm. C. XIX 25—35; 14—18 mm. Arms ± XVI, 45 mm. — P_1 15; 4,5 mm. P_2 17; 7 mm. Distal p. 14; 8,5 mm. P_3 small 3,5—4 mm. P_5 and P_6 17, + 9 mm. Disk regenerating.

The interradial prominences of the R—s most distinct on the youngest specimens, then the I Br-s 1 increase more rapidly and come in lateral apposition. In the largest specimens I Brax is almost rhombic with variable carination. The wing-like prominences on the 1st and 2d segments of the promimal pinnules are in Sp. 6 distinct out to about P_{10} but still noticeable on the distal pinnules.

Thalassometridæ A. H. Clark.

Pterometra A. H. Clark.

Pt. trichopoda A. H. Clark.

Fig. 101, 102.

Syn.: *Ptilometra trichopoda* 1908 A. H. Clark Wash. Smiths. Misc. Coll. Vol. 52, p. 224.

Pterometra trichopoda 1911 A. H. Clark Wash. Proc. U. S. Nat. Mus. Vol 39, p. 545; 1912 Crin. Ind. Oc., p. 190; 1915 Monograph, p. 81; 1918 Siboga Exp. Vol. 42 B. p. 143.

From St. 75 (1 sp.), 48 (1), 59 (3) = 5 specimens.

Sp. 1 (St. 45) Cd h = 2 mm., br = 2 mm. with 5 radially arranged warts on the dorsal cone.

C. XXIV 67 (D)—75 (V), 38—44 mm. arranged in 10 rows, 2 rows in every radius, and 2 or 3 cirri in every row. 4th segment cubical, 5th to about 20th L = 1 1/2 br, then shorter segments again. Distal

segments L = 1/2 br with a strong dorsal spine (h = 1/4—1/3 of the br of the segment) from the 30th or the 40th segment. 5th—12th with a large ventral spine in the distal margins of the segments. The ventral spine curved and projecting over a part of the following segment, L = 1/3 of the br of the cirral. Terminal claw about as long as the preceding segment.

B—s projecting in the corners. R—s h = 1/3 br with a mediodorsal tubercle, sharply set off on the ossicle. I Br 1 h = 1/4 br, laterally contiguous in the basal parts, with a longitudinal crista. I Br 2 h = 1/3 br with a similar crista on the proximal 2/3 of the ossicle. A similar prominence also on the II Br—s and on Br 1—2. II Br—s: 2. Arms XX, 60 mm. Br 1—9 discoidal, then oblique joints. Distal segments (from about the 40th segment) provided with a slight dorsal spine as in an *Asterometra*-species. Ex. of syzygies: 3 + 4, 16 + 17, 23 + 24, 30 + 31 . . etc.

P_1 11; 4,5 mm. P_2 16; 8 mm. P_3 11; 8 mm. P_6 12; 9 mm. (1st segment L = 1/2 br, 2d about cubical, 3d and the following ones L = 1 1/2 — 2 × br, prismatic, smooth). Distal p. 18; 10 mm. (the last 6 segments more delicate, slightly collar-shaped). — Disk thrown off. Colour (in spirit): arms and p—s white-grey. Cirri violet.

Sp. 2 (St. 48). C. XV 64—70; 35—44 mm. Arms XIV, 50 mm. II Br—s: 2.

P_1 8; 4,2 mm. P_2 10; 5,2 mm. P_3 10; 5,8 mm.

Sp. 3 (St. 59) C. XVI 61—68; 30—35 mm. A dorsal spine from the 22th(—26th) segment; the ventral spine from the 4th—the 10th (or 12th) one.

R—s h = 1/6 br. I Brax h = 1/2 br. Arms XIV +, broken. — P_1 7 +, 3,5 mm. Disk 6,5 mm. with calcareous granules. — Differing from Sp. 1 by the lower and dorsally smooth Cd. A younger specimen.

Sp. 4 (St. 59) Cd h = 3 mm., dorsally as in Sp. 1. C. XXII 66—84; 30—48 mm. The ventral spine from the 4th to the 13th segment. — Primipostaxillaries basally contiguous inside. I Br 1 and II Br 1 with the proximal borders somewhat bent outwards on both sides of the median line. In the latter case (II Br 1) this condition only on the outside. Arms XX, broken. II Br—s: 2. Syzygies with an interval of 6—7 oblique articulations. The Br—s with a blunt dorsal

spine from about the 15th segment. P_1 10 +, 5 mm. Disk 10 mm., thrown off.

Sp. 5 (St. 59) Cd h = 1,5 mm., with 5 indistinct, radial tubercles, and a slight central prominence. — C. XV 68—75; 32—37 mm. The ventral spine from the 4th—10th segment. Dorsal spine from the 20th—25th.

Arms XVII, broken. II Br—s : 2. P_1 9; 4 mm. Disk very much incised and granulated. Longest diameter 6, shortest 3 mm.

The proximal parts of the animals narrow; the arms after about Br 8 strongly bent outwards. Differ from the original specimen chiefly by having fewer arms and a somewhat smaller size.

Asterometra A. H. Clark.

A. macropoda A. H. Clark.

Fig. 99, 100.

Syn: *Antedon macropoda* 1907 A. H. Clark Proc. U. S. Nat. Mus. Vol. 33, p. 136.

Ptilometra macropoda 1908 A. H. Clark Wash. Smiths. Misc. Coll. Vol. 50, p. 359.

Asterometra macropoda 1908 A. H. Clark Bull. Mus. Comp. Zool. Vol. 51, p. 245; 1912 Crin. Ind. Oc. p. 193; 1915 Monograph pp. 155, 235 etc.; Wash. Journ. Acad. Sci. Vol. 5, p. 215; 1918 Siboga Exp. Vol. 42 B, p. 141.

From St. 12 = 2 specimens.

Sp. 1 (St. 12) Cd: br = 3 mm., visible h = 2 mm. 5 dorsal, close, radial tubercles arranged round a small, central cavity. — C. XVI 55—75; 45—55 mm. in 5 groups separated by inconspicuous radial interspaces. The 10th to the 25th segments: L = 1 1/3—1 1/2 br. From about the 30th segment L = br, from the 40th L = 2/3 br, the distal segments L = 1/2 br. About the 25th segment the cirrus becomes serrate on the dorsal side in lateral profile. The dorsal spine h = 1/4 of the br of the segment, on the distal segments smaller. Opposing spine h = 1/3 of the br of the segment. Terminal claw a little shorter than the penultimate segment. Cirri laterally pressed together.

R—s h = 1/3 br. with a small tubercle well limited. I Br—s 1 baso-laterally fused, somewhat broader than the R—s, in close synarthrial articulation with the axillary. No synarthrial prominence. Axil-

lary h = 1/2 br. Arms X, 65 mm. Br—s 1 inside united in pairs to 1/3 of the h, like Br 2 broader on the outside. The ossicles laterally flattened out to Br 4. After Br 10 oblique joints. Syzygies usually 3 + 4, 21 + 22, 32 + 33, 42 + 43 etc. with an interval of 8—10 oblique articulations. In one abnormal case, however:

$$\text{I } 1\text{—}2 \begin{cases} \text{Br } 1\text{—}2\ 3+4\ (5+6)\ldots 22+23\ldots 38+39\ldots \\ \text{Br } 1\text{—}2\ldots\ldots\ldots\ldots 27+28\ldots. \end{cases}$$

After Br 50(—60) a prominent, distally directed, median, dorsal claw which on the outermost segments becomes a strong spine, h = 1/3—1/2 of the br of the Br, when viewed in lateral profile. 7—8 of the most distal Br—s with rudimentary pinnules.

P_1 9—10; ± 5 mm. (P_a 10; 5 mm., a little more slender) coarse and thick with prismatic pinnulars. 1st and 2d segments short, the other ones somewhat longer than broad. P_2 8—10; 5 mm., P_3 similar, Distal p. 16; 6,5 mm. Disk thrown off. Colour (in spirit) white.

Sp. 2 (St. 12) C. XV 85—90; 75—80 mm. A dorsal spine from about the 40th segment.

I Br 1—2 with a slight synarthrial prominence. Each of the two ossicles with a central, inconspicuous, small wart. I Br 2 moreover with 2 low ridges starting from the wart and running proximolaterally. Arms X, 70 mm. Ex. of syzygies: 3 + 4, 9 + 10, 13 + 14, 19 + 20 . . . or 3 + 4, (7 + 8), 14 + 15, 19 + 20, 26 + 27, 32 + 33, 44 + 45, . . . A dorsal Br spine from about the 50th segment. The rudimentary Br—s are 8.

P_1 13; 5,5 mm., P_2 10; 5,7 mm., P_3 11; P_4 12; 6 mm., P_a 14; P_b 11, of about the same length. Distal p. 16—20; 7 mm. (1st and 2d segment shorter and a little thicker than the following ones, the L of which is 1 1/2 × br). The pinnules laterally compressed and therefore with a dorsal rim. — Disk thrown off.

The specimens are closely related to *A. macropoda*, from which they differ by having almost smooth proximal brachials. Sp. 1 is a rather young individual with cirri shorter than the arms. The radial, dorsal tubercles of Cd are, however, well developed and by this it can easily be distinguished from *A. anthus*. The dorsal spines of the cirri are not so prominent and pointed as in *A. anthus* (cf. the figures).

Asterometra anthus A. H. Clark.

Fig. 92—98, Photo 16.

Syn.: *Antedon longicirra* (part) 1893 Bell Journ. Linn. Soc. Vol. 24, p. 339.
Antedon anthus 1907 A. H. Clark Proc. U. S. Nat. Mus. Vol 33, p. 136.
Ptilometra anthus 1908 A. H. Clark Smiths Misc. Coll. Vol. 50, p. 359.
Asterometra anthus 1912 A. H. Clark Crin. Ind. Oc., p. 193; 1915 Wash. Journ. Acad. Sci. Vol. 5, p. 215; 1918 Siboga Exp. Vol. 42 B. p. 141.
Asterometra acerba 1909 A. H. Clark Proc. Biol. Soc. Vol. 22, p. 147; 1912 Crin. Ind. Oc., p. 193; 1915 Monograph p. 181; 1918 Siboga Exp. Vol. 42 B, p. 141.
Asterometra lepida 1908 A. H. Clark Wash. Proc. Biol. Soc. Vol. 21, p. 229; 1909 Videnskabl. Meddelser, København, p. 181; 1912 Crin. Ind. Oc., p. 195; 1915 Wash. Journ. Acad. Sci. Vol. 5, p. 215; 1918 Siboga Exp. Vol. 42 B, p. 141.

From St. 45 (5), 46 (2), 47 (5), 53 (11), 54 (2), 55 (1), 56 (7), 57 (1), 59 (20) = 54 specimens.

Sp. 1 (St. 51) Cd pointedly conical, br 3 mm., visible h = 3 mm. Dorsal pole smooth, arched, somewhat hollowed at the top.

C. XVII 80—81; 50—55 mm. arranged in rows which are separated by radial interspaces. 1st and 2d segments short, then increasing to cubical or a little longer (5th—20th segment), distally decreasing again, from about the 40th segment L = 1/2 br. Usually the 3d (or 5th)-about the 15th segments have a dorsal crista, which is most marked on the proximal segments. The 15th—25th segments are most often more or less smooth, then a dorsal crest appears, which distally becomes pronounced to dorsal spines. Opposing spine larger than the preceding ones, h = 1/2 of the br of the segments (3—5 last segments before the penultimate one have very slight dorsal spines or lack them entirely. Terminal claw short, as long as the preceding segment).

R—s h = 1/4 br with a tubercle on the medio-dorsal part. I Br 1 baso-laterally united, br = 2 1/2 × L. I Brax low pentagonal, like the preceding ossicle with an indistinct, median, longitudinal crista. II Br—s : 2, similar to the I Br—s. Arms XVI, 65 mm. Primipostaxillaries connected basally in pairs. Arms laterally sharply flattened out to about Br 10. Ex. of syzygies: 3 + 4, 12 + 13, 22 + 23, 30 + 31, 37 + 38 . . . or 3 + 4, 13 + 14, 21 + 22, 28 + 29, 35 + 36, 41 + 42, 48 + 49, 55 + 56 . . in a single case 4 + 5, 13 + 14 . . . After Br 10 decidedly

triangular segments. The Br—s with a median, dorsal, distally directed spine after the 40th(—50th) segment. The last 10 Br—s with rudimentary pinnules.

P_1 12; 5 mm. (1st segment shorter than long, the following ones L = 1 1/2—2 br, smooth, prismatic), P_2 12; 5,5 mm. P_3 12; 6 mm. P_{10} 15; 8 mm. Distal p. 18; 10 mm. (The L of the segments = 2 br).

Disk 8,5 mm. Colour (in spirit) yellow-brown. In life probably flame-coloured (the spirit and still more the formalin in which the following specimens are preserved brightly red-coloured). — One arm with an entoparastical gastropode (*Stylina?*).

Sp. 2 (St. 56) Cd br 4 mm., h 4 mm. The dorsal cavity slightly developed. No distinct dorsal spine on the cirri before the 20th(or 25th) segment (the 6th—12th segment with a slightly indicated dorsal crista). Syzygies in some cases 1 + 2 3 + 4 . . or 3 + 4 5 + 6. Example:

I 1–2
- II 1—2
  - Br 1—2 3 + 4 . . . 7 + 8 9 + 10 . . . 13 + 14 . . 20 + 21 . . 27 + 28 . . . 33 + 34 . . . 39 + 40 . . .
  - Br 1 + 2 3 + 4 . . 9 + 10 . . 15 + 16 . . 20 + 21 . . 28 + 29 . . 34 + 35 . . 40 + 41 . . 45 + 46 . .
- Br 1—2 3 + 4 . . . . . 10 + 11 . . . 17 + 18 . . . 25 + 26 . . 32 + 33 . . 38 + 39 . . 43 + 44 . . 48 + 49 . .

Parasitic *Stylinas*. For further details, as in the following specimens, see the table.

Sp. 3 (St. 56) Cd without dorsal cavity. Cirrals with a dorsal crista on most of the C. from the 4th—5th segment. No gap between this and the dorsal spines, which occur from about the 15th segment. The arms laterally flattened to Br 4. A dorsal spine on the Br—s from about the 60th segment. Last 8 segments with rudimentary p—s. — Parasitic *Stylinas*.

Sp. 4 (St. 56) Cd lower than in the preceding specimen, not conical at the top. H: 1,5 mm., br 2,5 mm. No dorsal cavity. — Cirrals 3—5 with a dorsal spine, then a crista. About the 15th segment smooth cirrals which gradually become dorsal spines distally. — R—s with a slight tubercle. Dorsal spine from the 40th Br.

Sp. 5 (St. 56) Cd and C. as in Sp. 4. R—s with a very high and well marked tubercle. I Br 1 with a trace of a crista. Br—s with a dorsal spine from about the 20th segment. Last 7 segments with rudimentary pinnules.

Sp. 6 (St. 56) 3d—5th cirral with a small dorsal spine; 6th—10th (or 15th) segments smooth. R—s with a very small tubercle. Dorsal spine from the 40th Br.

Sp. 7 (St. 56) A rather small specimen. The cirrus-segments longer than in the preceding specimens. 2d—6th cirral with both a ventral and a dorsal crista, 7th—10th(or 12th) segments smooth. — R—s with a high prominence. I Br—s almost smooth. Example of syzygies: 3 + 4, 14 + 15, 22 + 23, 31 + 32 . . . Dorsal spine from the 35th Br. 2—4 segment with rudimentary p—s. — Parasitic *Stylina*.

Sp. 8 (St. 59) Cd pointedly conical, h = 3 mm. Cirri with a dorsal spine from 3d—7th(or 15th) segments, after these usually some smooth cirrals. 9th—25th segments longer than broad. All the distal segments with spines. Opposing spine usually not longer than the preceding ones. — R—s h = 1/3 br. Arms laterally flattened out to Br 8. Dorsal claw from the 60th Br. Colour red-brown.

Sp. 9 (St. 59) More often than in Sp. 8 weak spines before the opposing spine. R—s: h = 1/3 br with a dorsal crista. Dorsal claw from the 50th or 60th Br, h = 1/3 of the br of the segment. The L of the distal pinnulars = 2 1/2 br.

Sp. 10 (St. 59) H of Cd 2,5 mm. No dorsal spine before the 20th(—25th) cirral. From about Br 65 a dorsal claw, h = 1/3 of the segment.

Sp. 11 (St. 59) R—s: br = 2 1/2 × L. Dorsal claw from about Br 50, the h as in sp. 10.

Sp. 12 (St. 59) Cd rather bluntly conical, h = 2 mm. R—s with a very slight dorsal tubercle. The proximal Br—s a little knobby. Dorsal spine from the 50th(—60th) Br. The L of distal pinnulars 2 1/2 — 3 × br.

Differs by having a somewhat lower and more rounded Cd and a weaker radial tubercle.

Sp. 13 (St. 59) H of Cd 3 mm. R—s: h = 1/4 br with a slight dorsal tubercle. Arms broken. 1st syzygy in one case between Br 1 and 2. Fewer pinnulars on P_1 (8) after II Brax. Disk 7 mm.

Sp. 14 (St. 59) Cd pointedly conical, h = 2,8 mm. The proximal row of prominences on the cirri indistinctly separated from the distal one. R—s h = 1/3 br with a dorsal tubercle, indistinctly limited distally. Dorsal spine from the 50th Br.

P_4 10; 6 mm., P_5 14; 7,5 mm. The longest segments on the distal p—s at least L = 3 br. Disk 6 mm.

Sp. 15 (St. 59) R—s h = 1/4 br with a dorsal crista. Dorsal spine from about the 40th Br. P_4 11; 6 mm. The L of the distal pinnulars = 2 1/2—3 1/2 br.

Sp. 16 (St. 59) H of Cd 3 mm., bluntly conical. R—s: h = 1/5 br with a dorsal tubercle. A dorsal claw from the 60th Br (h = 1/3 of the br of the segment). P_4 13; 8,5 mm. The L of the distal pinnulars 2—2 1/2 br. — Parasitic *Stylina*.

Sp. 17 (St. 59) R—s h = 1/4 br with a dorsal tubercle. Dorsal claw from Br 50. The L of distal pinnulars 2 1/2—3 br.

Sp. 18 (St. 59). Cd bluntly dome-shaped, h = 4,5 mm. Cirrus-marks arranged in 5 groups; in each group 3—5 C. All the cirri thrown off. R—s h = 1/5 br. Arms sharply flattened laterally out to Br 4. Dorsal spine from about Br 55. An example of multiplicative regeneration of arms:

$$\text{I } 1\text{—}2_1 \begin{cases} \text{II}_1\ 1\text{—}2 \begin{cases} \text{Br}_1 \\ \text{Br}_1 \end{cases} \\ \text{II}_1\ 1\text{—}2 \begin{cases} \text{Br}_1 \\ \text{Br}_1 \end{cases} \end{cases}$$

Sp. 19 (St. 59) Cd a pointed cone. R—s: h = 1/3 br with a dorsal crista. A dorsal claw from about Br 55. The L of distal pinnulars 2 1/2 br.

Sp. 20 (St. 59) H of Cd 3,5 mm. R—s h = 1/4—1/3 br with a dorsal crista. A dorsal spine from Br 55. The L of distal pinnulars 2 1/2—3 br.

Sp. 21 (St. 59). Dorsal Br spine from about the 40th segment, slowly increasing. The L of distal pinnulars 2 1/2 br.

Sp. 22 (St. 59) H of Cd 2,5 mm., pointedly conical. R—s h = 1/4 br with a dorsal tubercle. Dorsal Br-spine appearing first about the

75th segment, rather low. P_4 12; 6,5 mm. The L of distal pinnulars 2—2 1/2 br.

Sp. 23 (St. 59) R—s h = 1/3 br with a slight tubercle. Dorsal Br-spine from the 50th segment. The L of distal pinnulars 2 br.

Sp. 24 (St. 59) H of Cd 3 mm., cylindrical, dorsally rounded with a small cavity. R—s h = 1/6 br with a dorsal crista; a slight carination on I Br 1 and 2. Dorsal Br-spine rather weak, from about the 50th segment. The L of distal pinnulars 2 br. — Parasitic *Stylinas*.

Sp. 25 (St. 59) R—s h = 1/4 br with a dorsal tubercle. I Br 1 smooth. Arms broken.

Sp. 26 (St. 59) Cd a rather low (h = 2 mm.), pointed cone. The short dorsal cirri with the 7th—14th segments slender, L = 2 br. — R—s h = 1/3 br with a dorsal crista. Dorsal Br-spine from the 50th segment. The L of the distal pinnulars 2—2 1/3 br. Disk 7 mm.

Sp. 27 (St. 59) H of Cd 3,5 mm. R—s h = 1/3 br with a dorsal crista. Dorsal Br-spine from the 50th segment. The L of the distal pinnulars 2—2 1/2 br.

Sp. 28 (St 46) Cd: h: 3, br: 3 mm. Most cirri broken or very small. From the 7th cirral a dorsal crista which is gradually transformed into a dorsal spine. R—s h = 1/2—1/3 br with a small dorsal tubercle. B—s IR visible. Dorsal Br-spine from about the 55th segment, strongly curved, slowly increasing. The L of the distal pinnulars 2 1/2—3 br.

Sp. 29 (St. 46) A young individual. Cd smaller, h = 1 mm. Cirri slender, as in the dorsal whorl in older specimens. R—s: h = 1/1 or 2/3 br with a dorsal longitudinal crista. The arm-bases laterally flattened out to Br 4. Dorsal Br-spine from the 50th segment; because of the shortness of the arms only a small part of the arms spiny. The L of the distal pinnulars 2 1/2 br.

Sp. 30 (St. 53) R—s h = 1/5 br with a dorsal tubercle. Dorsal Br-claw from the 45th segment. The L of distal pinnulars on the distal pinnules 2 br.

Sp. 31 (St. 53) Cd with an arched and rounded dorsal pole. The proximal and distal series of prominences on the cirri not distinctly separated. R—s h = 1/4 br with a dorsal spine or crista. II Br—s as always : 2. A pair of new regenerated arms of somewhat unequal size.

Dorsal Br-claw from about the 50th segment P_5 10; 7 mm. P_8 13; 7,5 mm. The L of distal pinnulars = 2—2 1/2 br.

Sp. 32 (St. 53) R—s h = 1/3 br with a dorsal crista. Dorsal Br-claw from the 50th segment. The L of distal pinnulars 2 br.

Sp. 33 (St. 53) R—s as in the preceding specimen. Dorsal Br-spine from the 50th segment. P_5 14; 7 mm. — The L of distal pinnulars 2—2 1/2 br. P_3 of an arm grown out to a complete new arm.

Sp. 34 (St. 53) Cd rather low. Cirri typical. R—s h = 1/2 br with a dorsal crista. A very indistinct carination of I Br 1 and 2 and Br 1 and 2. Dorsal Br-spine from the 50th segment, rather low but rapidly increasing the last cm. The L of the distal pinnulars 2 1/2 br.

Sp. 35 (St. 53) H of Cd 2,5 mm., pointedly conical. R—s h = 1/3 br with a dorsal crista. Dorsal Br-spine from the 50th segment. The arms with 80—90 Br—s. The L of distal pinnulars 2 br. — Parasitic *Stylinas*.

Sp. 36 (St. 53) Cd as before. Dorsal Br-spine from about the 40th segment. The Br-segments 70—75.

Adolescent or juvenile specimens.

Sp. 37 (St. 53) Cirri: 1st segment short, 2d somewhat longer than broad, 3d L = 2 1/2 br, 4th and 5th cirral L = 2 br, 6th segment L = 1 1/2 br, distally widened, 7th and the following ones L = br, with an inconspicuous dorsal carination, which is transformed distally into a dorsal spine. Opposing spine h = 1/2 of the br of the segment. Terminal claw about as long as the penultimate segment.

B—s especially projecting in the corners, form basally a narrow, continuous ring. R—s h = 1 1/2 br, with a strong, longitudinal crista in the proximal 2/3. R—s laterally contiguous, enclose practically the whole intestinal sac. I Br—s 1 with a medio-dorsal crista, like the axillaries well separated from each other laterally. The entire arm only 13—18 segments.

P_1—P_3 usually absent. Sometimes, however, P_1 and P_3 developed. Observe the considerable length of the distal pinnules, when compared with the arm. The Br—s, especially Br 8 and 11, appear almost as axillaries because of the relatively great size of the pinnules. Example of pinnulation:

R I 1—2 { Br 1—2 3+4 5 6 7 8 9 10+11 12 13 14 15 16 17
Br 1—2 3+4 5 6 7 8 9 10+11 12 13

Disk concealed, probably with orals; compare for instance sp. 38, 44, 45, 50, 51.

Sp. 38 (St. 53) The L of the distal pinnulars = 3 br. Rudimentary *orals*.

Sp. 39 (St. 53) and *Sp. 40* (St. 53) The L of the distal pinnulars on the distal p—s $2^1/_2$ br.

Sp. 41 (St. 45) L of cirral 5—7 = $1^1/_2$ br. The L of the distal segments = br. A dorsal spine from cirral 10. — B—s projecting IR as small prominences. R—s h = $1^1/_2$ br, in lateral apposition, with a strong longitudinal crista, proximally ending in a blunt spine. I Br—s 1: h = $^1/_2$ br. I Brax h = $^2/_3$ br. A slight synarthrial carination. Arms »wall-sided» with small lateral crests out to Br 2. The entire arm with 40 Br—s. A dorsal Br-spine from the 25th segment. The distal pinnulars with small spiny whorls in the distal ends. 3d and 4th pinnular L = 3 br.

Sp. 42 (St. 45) — *Sp. 43* (St. 45) —.

Sp. 44 (St. 45). The L of the segments of the dorsal cirri $1^1/_2$ — 2 br. Complete pinnulation. Small *orals*.

Sp. 45 (St. 45) P_2 wanting. *Orals* large and well developed, covering $^1/_3$ of the radius of the disk.

Sp. 46 (St. 47) R—s : h = $^2/_3$ br with a dorsal crista. The L of the distal pinnulars of the distal pinnules 2 br.

Sp. 47 (St. 47) R—s h = $1^1/_2$ br. An indistinct median crista on I Br 1 and 2. The L of the distal pinnulars = $2^1/_2$ br.

Sp. 48 (St. 47) R—s h = $1^1/_2$ br. The L of the distal pinnulars $2^1/_2$—3 br. *Orals* resorbed.

Sp. 49 (St. 47) R—s: h = br. I Br—s 1 and 2 rather smooth.

Sp. 50 (St. 47) R—s: h > br. A crista on I Br 1 and 2 with slight medio-dorsal tubercles. P_2 sometimes lacking. The L of the distal pinnulars $2^1/_2$ br. *Orals* thin, but well preserved.

Sp. 51 (St. 54) 4th cirral the longest L = 3 br. Dorsal spine from the 6th (— 10th) segment. — R—s h = $1^1/_2$ br, with a well bordered median tubercle. I Br—s 1 and 2 similar, but with a median keel, h = $^2/_3$ and $^1/_1$ × br respectively. A slighter keel on Br 1 and 2.

I Br 1 and Br 1 with a slight lateral carination. P_2 lacking. Small *orals*.

Sp. 52 (St. 54) R—s h = br. I Br 1 and 2 with a rather distinct median crista. The L of the distal p—s = 2 br.

Sp. 53 (St. 55) 3d—6th cirral the longest, L = 2 1/2 br. L of the distal segments 1 1/2 br. A dorsal carination from cirral 9. Opposing spine : h = 1/2 of the br of the segment.

B—s as in Sp. 37. R—s h = 1/2 br, with a high carina, IR somewhat extended and projecting as flaps between I Br—s 1. The very last Br-segments with a small dorsal spine. The pinnule-supporting Br-s usually shaped like axillaries. — The first pinnule most often on Br 7 (sometimes also a small P_1). An axillary partly supports a long arm on the left, which is 5 mm. long, and provided with a small P_1 and distal pinnules, and partly a smaller arm on the right, 2 mm., without pinnules. Of the remaining arms too the right ones are usually a little shorter than the left ones. P_3 12; 2 mm. Example of pinnulation:

R I 1—2 { Br 1—2 3 + 4 5 6 7 8 9 10 11 12 + 13 14 15
{ Br 1—2 3 + 4 5 6 7 8 9 10 11 12 13 14 15

Sp. 54 (St. 57) R—s h = br. I Br 1 and 2 rather smooth. P_2 missing. The L of the distal pinnulars = 2 br. Disk 1,8 mm. *Orals* resorbed. A small intumescense for a parasitic *Stylina*.

Generally the radial crista is more distinct on the R—s in younger specimens since the R—s are longer then. With increasing age the R—s are more and more concealed by Cd, and shortened by the rapid increase in the breadth. By this the crista also grows smaller and finally only remains as a rounded tubercle.

An investigation of the number of arms in the (nearly) full-grown specimens 1—36 shows the following distributions. X arms: 18 specimens, XI: 9 sp., XII: 5 sp., XIII: 2 sp., and XVI: 2 sp. It is rather peculiar that the largest specimens often have only X arms, while the multibrachiate specimens have shorter arms. A similar condition is also noticed in *Cyllometra pulchella* and has perhaps something to do with the catching of the food.

Number of Specimens and Stations	Cirri			Arms		Interspace of obliq. artic. between the syzygies	P_1		P_2		P_3		Dist. p.	
	N	S	L	N	L		S	L	S	L	S	L	S	L
Sp. 1 (St. 56)	XVII	80—81	50—55	XVI	65	6—9	12	5	12	5,5	12	6	18	10
Sp. 2 (St. 56)	XX	85—90	60—70	XII	90—100	4—7	13	6	13	7	13	6,5	17—9	11
Sp. 3 (St. 56)	XX	71—86	40—56	XI	80	4—6	12	5,5	9	5,5	9	6	18—19	11,5
Sp. 4 (St. 56)	XVI	69—76	40—55	X	70	6—11	8	4	10	5	10	5	16	10
Sp. 5 (St. 56)	XVI	59—82	26—54	X	80	6—8	—	5	—	5,5	—	5	19	10
Sp. 6 (St. 56)	XVI	57—68	35—48	XII	55	6—9	9	4,5	9	5,5	7	6	15	8
Sp. 7 (St. 56)	XIII	39—62	14—29	X	35	—	9	3,5	9	4	10	4	16	7
Sp. 8 (St. 59)	XVII	77—90	45—65	X	95	4—6	12	7	12	8	9	7,5	16	11
Sp. 9 (St. 59)	XIX	56—75	40—50	XI	75	6—7	12	5,5	11	6,5	7—9	5	18	11
Sp. 10 (St. 59)	XVII	65—85	45—60	XI	85	4—6	14	6,5	14	8,5	13	8	22	12,5
Sp. 11 (St. 59)	XVIII	65—85	40—65	X	85	5—10	11	5,5	11	6	11	6	20	13
Sp. 12 (St. 59)	XX	65—80	40—55	X	95	6—11	12	6,5	12	7,5	11	7	22	13,5
Sp. 13 (St. 59)	XXI	55—+	35—+	XIII	—	—	8—10	5	9—10	6	8	5,5	—	—
Sp. 14 (St. 59)	XX	60—70	30—55	X	85	4—5	11	6,5	13	9	11	8	21	12,5
Sp. 15 (St. 59)	XVIII	50—65	30—50	XI	70	6—9	11	6	11	6,5	9—10	6,5	18	11
Sp. 16 (St. 59)	XXII	—	—	XI	95	4—7	12	7	13	9	11	7	—	10 +
Sp. 17 (St. 59)	XX	61—82	40—65	X	85	4—6	—	—	12	7	10 +	7	17—20	11,5—13,5
Sp. 18 (St. 59)	XX	—	—	XII	100	6—7	13	7	14	9,5	12	8	—	12 +
Sp. 19 (St. 59)	XVII	65—83	38—68	X	85	(3—)5—6	—	—	—	—	—	—	19	11,5
Sp. 20 (St. 59)	XXII	72—82	55—73	X	105	6	—	—	—	—	—	—	22	15
Sp. 21 (St. 59)	XIX	75—86	38—63	X	85	5—6	—	—	—	—	—	—	17	11
Sp. 22 (St. 59)	XXI	55—75	30—57	X	75	6—7(—17)	10	5	12	5,5	10	6	20	11
Sp. 23 (St. 59)	XVIII	56—76	32—57	XI	65	4—6	—	5	11	5,7	10	6	19	10,5
Sp. 24 (St. 59)	XXIII	68—77	45—60	X	70	5—7	—	—	—	—	—	—	—	± 10
Sp. 25 (St. 59)	XVIII	70—100	55—70	X	—	—	9	6	11	7,5	9	7	—	—
Sp. 26 (St. 59)	XV	56—70	25—47	X	± 60	5—6	10	5,5	—	—	—	—	18	9,5
Sp. 27 (St. 59)	XVII	67—82	48—62	XI	85	6—9	11	5,5	12	7	9	6,2	18	10
Sp. 28 (St. 46)	XXII	—80	45	XVI	70	4—8	12	—	13	> P_1	12	—	16	10—11
Sp. 29 (St. 46)	XV	41—46	14—18	X	25	3—6(—9)	8—9	2,5	9	3	8	2,5	15—16	5,5—6
Sp. 30 (St. 53)	XXI	69—85	45—70	XII	90	4—7	—	—	—	—	—	—	19—22	11,5—12,5
Sp. 31 (St. 53)	XVI	62—81	40—65	XIII	80	6(—17)	11	5,5	11	6	12	5,5	19	11,5—12
Sp. 32 (St. 53)	XVII	65—72	25—40	XII	55	4—6	11-12	5,5	11	6	9	—	17	8,5—9,5
Sp. 33 (St. 53)	XVIII	65—85	36—53	X	75	5—7	13	5,5	12	6	11	5,8	18—20	11—11,5
Sp. 34 (St. 53)	XIV	55—64	30—35	XI	70	5—6	13	5	11	5,8	9	5,8	18	11,5
Sp. 35 (St. 53)	XI	60—65	25—35	XI	50	7—8	—	—	—	—	—	—	18	10
Sp. 36 (St. 53)	XVI	50—60	20—30	X	45	5—7	9	3,5	10	3,8	9	3,5	18	9
Sp. 37 (St. 53)	XI	20—21	2,5—3,0	X	7	—	—	—	—	—	—	—	14	3
Sp. 38 (St. 53)	XIV	20—35	7—10	X	15	—	—	—	—	—	—	—	15	5,5
Sp. 39 (St. 53)	XI	25—35	8—13	X	15	—	—	—	—	—	—	—	15	5,5
Sp. 40 (St. 53)	XIII	17—31	3—11	X	15	—	—	—	—	—	—	—	15	5,0
Sp. 41 (St. 45)	XI	27—34	7—10	X	15	5	7	2,3	7	2	9	—	13	5
Sp. 42 (St. 45)	XII	26—36	7—11	X	18	4	8	2,3	8	2	—	—	13	5
Sp. 43 (St. 45)	XVI	23—32	5—10	X	15	—	9	2,5	8	2,1	10	3,2	—	—
Sp. 44 (St. 45)	—	13—30	2—8	X	12	—	—	—	—	—	—	—	—	—
Sp. 45 (St. 45)	XIV	12—26	2—5	X	8	—	7	1,7	—	—	—	—	—	—
Sp. 46 (St. 47)	XIII	42—46	15—23	XII	35	5—6	—	—	—	—	—	—	17	7
Sp. 47 (St. 47)	XIV	27—34	5—9	X	20	—	8	3	8	2,5	—	—	15	5,5
Sp. 48 (St. 47)	XII	25—36	7	X	12	5	7	—	8	2	—	—	11	5
Sp. 49 (St. 47)	XIV	—	12	X	25	—	10	3	10	3,5	9	± 3,5	—	—
Sp. 50 (St. 47)	X	20—32	4—10	X	15	—	9	2	9	1,8	8—9	2,5	12	4
Sp. 51 (St. 54)	XVI	(14)—27	(3)—7	X	8	—	9	2,2	—	—	—	—	—	—
Sp. 52 (St. 54)	XV	—	10—16	X	25	—	—	—	—	—	—	—	—	6,5
Sp. 53 (St. 55)	XI	16—22	4—5	X	7	—	—	—	—	—	—	—	—	—
Sp. 54 (St 57)	XV	17—32	4—10	X	12	—	8	2,5	—	—	10	2,8	14	4

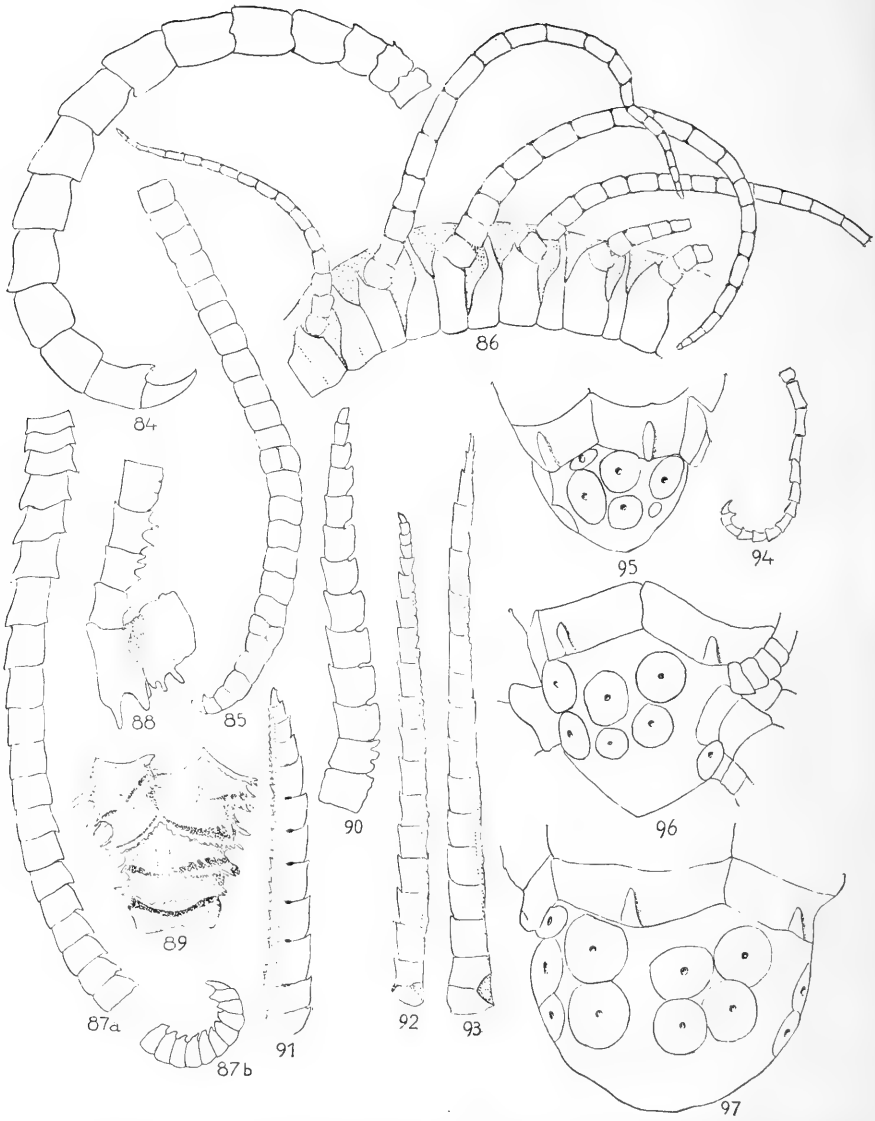

Fig. 84 *Diadontometra Bocki* Cirrus $^{9}/_{1}$; 85, 86 *Liparometra grandis* (St. 39) 85) The distal part of a cirrus with two abnormally longitudinally split cirrals $^{7}/_{1}$. 86) The proximal part of an arm with P_1—P_6 (P_4—P_8 with broken tips); observe Br 1 + 2 3 + 4, $^{7}/_{1}$; 87—91 *Stenometra dentata* (St. 56) 87 a) The most proximal 20 cirrals, b) The distal part of the cirrus $^{9}/_{1}$, 88) Br 2—4 with the base of P_1 $^{14}/_{1}$. 89) The proximal part of the arm $^{9}/_{1}$. 90) P_1 $^{14}/_{1}$, 91) Distal pinnule $^{14}/_{1}$; 92—97 *Asterometra anthus* 92) Distal pinnule of the type of *A. anthus* (St. 56) $^{9}/_{1}$, 93) Distal pinnule of the type of *A. acerba* (St. 59) $^{9}/_{1}$, 94) Cirrus of a very young animal (Sp. 51), × 17 $^{1}/_{2}$, 95) Cd of Sp. 34 (*lepida* type) $^{9}/_{1}$, 96) Cd of Sp. 27 $^{9}/_{1}$, 97) Cd of Sp. 18 $^{9}/_{1}$.

The L of the distal p-s with some irregularities follows the L of the arms; nevertheless it shows great variability in specimens with an arm-length of 70—90 mm.

A. H. Clark has distinguished the two species *A. anthus* and *A. acerba* by the following characteristics:

A. anthus	*A. acerba*
A) Distal pinnules 9 mm.	a) distal pinnules 13 mm.
B) The outer segments of distal p-s: L = 2 × br.	b) the outer segments of dist. p-s L > 3 × br.
C) The Br dorsal spines long and strongly curved	c) the Br dorsal spines blunt, short, not much curved.
D) R—s with a rounded tubercle	d) R—s with a dorso-ventrally elongated tubercle.
E) I Br-s without median carination	e) I Br-s with a faint, low median carination.
(F) Arms more than X.	f) Arms X).

Some examples from the above-described specimens may be quoted and may be denoted as follows:

Sp. 1	A(a) Bc D E F	*Sp. 14*	a b C D E f
Sp. 9	Aa Bb C d E F	*Sp. 15*	Aa b C d E F
Sp. 24	A(a) B c d e (F) f	*Sp. 34*	(A)a Bb Cc d e F
Sp. 12	a (B)b C D E f	*Sp. 20*	a b C d E f

From the above cited examples it seems evident to me that the characteristics of *A. anthus* and *acerba* are irregularly mixed in the different specimens. Clark lays special stress upon the fact that the L of the distal pinnules and pinnulars and the blunt spines on the distal Br-s are characteristic of *acerba*. This combination scarcely ever occurs in the above-described specimens, but often long p-s together with strongly developed Br-spines.

From what is stated above — the examples could be multiplied — it seems to me to be clear that *A. anthus* and *acerba* ought to be referred to the same species.

A. lepida is a third species of the genus *Asterometra* that A. H. Clark has described. It is a form differing from the two previously mentioned species (which have a large cylindrical Cd with a conical end) by a small and conical Cd. It is further mentioned that the cirrus-sockets

are smaller and therefore the cirri too, which are lacking on the only known specimen, are probably more slender than in the other species. With regard to the last characteristic I may emphasize the following facts. It is a general rule that cirri formed in the dorsal cirrus-whorl (also dating from a younger stage) are more slender than the ventral ones, which are formed at an older stage. The more robust the specimen is, the more coarse are also the cirri. Thus for instance the cirri in sp. 24 are thin and slender, in sp. 11 and 12 very much coarser and thicker. This character is therefore not necessarily so very important, when other distinguishing features which support the suggestion of a real difference between the species are not added. — With regard to *A. lepida* it is also stated that Cd should have a specific formation. A glance at the collected facts given above in the descriptions of the specimens shows that the appearance of Cd is also subject to great variation. I have selected sp. 18, 27 and 34 to be reproduced. The last-mentioned specimen, which has an arm-length of 70 mm. and is therefore of the same size as the single specimen of *A. lepida* found, has a small, conical Cd with relatively small cirrus-sockets. Cd of sp. 27 (arm-length 85 mm.) is a transition-form to Cd of Sp. 18 (arm-length 100 mm.) which is of typical *A. anthus-acerba* formation.

As all transitions between these two types are found among the above-described specimens, I cannot consider *A. lepida* to be a separate species but regard it only as a younger individual of *Asterometra anthus*.

Finally some words about the above-described very young specimens. One can plainly follow the growth-abbreviation of all ossicles, already observed by P. H. Carpenter. Perhaps one finds this fact demonstrated best in the proportion between L and br of the cirrals (cf. e. g. sp. 1; 37 and 53), but one can also get good subjects for demonstration in the R—s and proximal Br-s. In the latter one can also follow the disappearance of the juvenile carina on I Br 1 and 2 and the appearance of certain marks of old age (the indistinct crista on the same ossicles in certain old specimens). The pinnulars seem to be but slightly affected by this abbreviation (cf. e. g. sp. 1 and 54).

The occurrence of orals is also very interesting. In specimens of an arm-length of less than 10 mm. they are well preserved, but

usually begin to be resorbed at an arm-length of 10—12 mm. and are completely lost when the arms measure 15 mm., that is at about the same time as the arms get a complete pinnulation. — The smallest specimens have also large B—s which form a continuous ring visible under the radial whorl. In the smallest specimens the latter practically encloses the whole intestine sac. All these primitive characteristics thus persist rather late.

Stenometra A. H. Clark.

St. dentata n. sp.

Fig. 87—91. Photo 7.

From St. 55 (1), 56 (5), 59 (3) = 9 specimens.

Sp. 1 (St. 56) Cd cylindrical, the flattened, dorsal pole with small spines; diameter of the dorsal surface 2 mm. H of the free part of Cd 1,5 mm.

C. XXIV 74—76; 25—34 mm. in two close whorls, which are ventrally divided in groups, separated IR by ribbons of Cd. 1st segment short with a distal collar which, especially ventrally, has a somewhat serrate border. 2d and 3d segments L = 1/2 br, similar to the preceding segment but with a slighter distal collar. 4th and 5th segments cubical or a little longer. 6th—10th slightly hour-glass-shaped, L = 1 1/2 br. 1st—7th segments with a small ventral spine, slightly projecting in lateral profile, because of the above-mentioned collar. 8th—13th(—16th) segments smooth, then a dorsal spine. Distal segments L = 1/2 — 1/3 × br. Dorsal spine small, distinct, distally curved, h = 1/3 — 1/4 of the br of the segments. Opposing spine somewhat coarser, h = 1/2 of the br of the segment. Terminal claw about as long as the penultimate segment.

R—s narrow bands, IR somewhat bent outwards by the interradial ribbons on Cd, L = ± 1/6 br. 1 Br 1 h = 1/4 br, laterally free, with a median carination and moreover both proximally and distally a vertical 4—5-lobated calcareous plate, constituting the enlarged and overlapping ends of the segment. 1 Brax h = 1/2 br, rhomboidal, in the

proximal part with a well-bordered, strong, median tooth visible in side view as a high bidentate wing, which, together with the disto-median tubercle of I Br 1, forms a strong synarthrial prominence. The distal border of I Brax obtuse-angled, with 6—7 pointed prominences. II Br-s: 2, similar to the I Br-s, but with smaller and weaker synarthrial tubercles. Arms probably XX (II branches broken), 65 mm., indistinctly flattened laterally. The first 6 Br-s smooth, but with prominent, lamelli-shaped lobated prominences both proximally and distally (cf. above). In addition the most proximal Br-s partly with a median, dorsal prominence, which develops more distally to a dorsal spine, partly with a pair of similar medio-lateral prominences, alternately most developed on the left and on the right. These lateral tubercles, situated on both sides of the median dorsal spine, disappear at the 15th to 20th Br-segments and from these only the median dorsal spine remains. The distal segments rather strongly pressed together from the sides. Ex. of syzygies: 3 + 4, 22 + 23 or 3 + 4, 35 + 36 etc. with an interval of 6—11 oblique articulations. About 5 distal segments with rudimentary pinnules.

P_1 12—13; 8 mm. (5—7 first pinnulars concave on the outside, the concavity bordered by a more or less lobate wing-like prominence; 6th and the following segments a little longer than broad, smoother with a smaller wing and somewhat spiny distal collars); P_2 11; 5,5 mm. P_3 6; 4,5 mm. P_4 7, a little longer. Distal p. 12; 5 mm. (1st and 2d segments short, the following ones L = $1^1/_2$ — 2 br, the two last segments short again. The pinnulars smooth, in the proximal part triangular, in the distal part rounded).

Disk encrusted with coarse granules, like the other weak parts dark-brown. The ossicles are a lighter brown.

Sp. 2 (St. 56) C. XX 57—61; 20—25 mm. A dorsal spine already on the 12th cirral. Arms ± XX, 65 mm. I Brax rhombical. Already about Br 10 the dorsal claw is the only remaining prominence. Ex. of syzygies: 3 + 4, 31 + 32 or 3 + 4, 6 + 7, 32 + 33 etc.; distally with an interval of 8—11 oblique articulations. P_1 13; 7,5 mm. P_2 10; 5 mm. P_3 8; 4 mm. P_4 7; 3 mm. P_5 8; 3,5 mm. Distal p-s 11; 6 mm.

Sp. 3 (St. 56) C. XXVII 37—56; 14—24 mm. Dorsal surface of Cd 1,5 mm. Arms XX, 50 mm. Br-s with shorter processes than in the preceding specimens. A single dorsal spine from Br 10. Arms

distinctly flattened laterally out to Br 5. Syzygies with an interval of 13—16 oblique articulations. P_1 13—15; 5,5—7,5 mm. P_2 9—11; 4,5—5 mm. P_3 8—9, 4—5 mm. Distal p-s 11; 5 mm.

Sp. 4 (St. 56) C. XXI 43—57; 18 — + 22 mm. The 6 first cirrals with a real ventral spine. Dorsal spine from about the 10th—20th segment. Arms XV, 45 mm. The median keel on I Br 2 somewhat lower than in Sp. 1. Arms after Br 6 without lateral prominences. The dorsal Br-spine low. Syzygies with an interval of 5—18 oblique articulations. About 90 Br segments. The distal segments with rudimentary p-s are about 5. Example of arm-branching:

$$\text{I } 1\text{—}2 \begin{cases} \text{II } 1\text{—}2 \begin{cases} \text{Br } 1\text{—}2\ 3+4\ldots\ldots35+36\ldots\ldots56+59\ldots \\ \text{Br } 1\text{—}2\ 3+4\ldots\ldots33+34\ldots44+45\ldots53+54\ldots \end{cases} \\ \text{II } 1\text{—}2 \begin{cases} \text{Br } 1\text{—}2\ 3+4\ldots\ldots29+30\ldots \\ \text{Br } 1\text{—}2\ 3+4\ldots\ldots30+31\ldots\ldots43+44\ldots \end{cases} \end{cases}$$

P_1 12; 4 mm. (last 8 segments collar-shaped, their distal parts overlapping; a similar condition, though not so marked on P_2—P_4). P_2 9; 3,5 mm. P_3 9; 3 mm. P_4 8; 3 mm. Distal p. 12; 5,5 mm.

Sp. 5 (St. 56) C. XVIII 54—65; 25—30 mm. Arms XV, 60—65 mm. A regenerate from a II Br 1 with 2 small, still smooth arms. P_1 8—13; 4—6 mm. P_2 8; 4 mm. P_3 7; 3 mm. Distal p. 9—10; 5,5 mm.

Sp. 6 (St. 59) C. XVIII 62—65; 24—28 mm. Arms XVI, broken. II Br-s: 2. P_1 13; 5 mm. Disk 6 mm.

Sp. 7 (St. 59) C. XVII 53—60; 23—28 mm. Arms XV +, broken. II Br-s: 2. P_1 13; 6 mm. Disk 7 mm.

Sp. 8 (St. 59) C. XIV 40—43; 15—18 mm. in a partly double whorl, hardly divided in groups. The dorsal surface of Cd 1 mm. — Arms XII, 40 mm. The calcareous lamels on the proximal ossicles only slightly serrate. A single dorsal spine from Br 8. Syzygies with an interval of 5—8 oblique articulations. Example:

I 1—2 { Br 1—2 3 + 4 .... 16 + 17 .. 23 + 24 etc. with an interval of 5 oblique articulations
II 1—2 { Br 1—2 3 + 4 ... 21 + 22 .. etc. with an interval of 7—8 oblique articulations
Br 1—2 3 + 4 ... 21 + 22 .. etc. with an interval of 8 oblique articulations.

P_1 10; 4—4,3 mm. P_2 9; 3,5 mm. P_3 7; 2,5 mm.

Sp. 9 (St. 55) C. XV 20—21; 3,5—5 mm. (2d segment with a small ventral spine, 3d—5th segment L = 2 br, hour-glass-shaped, then shorter segments, from about the 10th L = br or shorter. A dorsal spine from the 6th segment, h = 1/4 of the br of the segments. Opposing spine h = 1/2 of the br of the segment.

R—s h = 1/2 br with a median crista and small distal prominences, IR fused and elongated, separating I Br-s 1. I Br 1 h = 2/3 br with a median tubercle and latero-distal prominences. Similar, still larger, lobate flanges on I Brax, Br 1 and Br 2. I Br 2 h = br, triangular with a small cavity in the distal angle. Arms X, 13 mm. Br (1—2) h = br, as the syzygial pairs Br 3 + 4. From Br 15 a medio-dorsal claw. The left arm often a little longer and better developed, in one case, however, the reverse. P_1 5; 1 mm., P_2 and P_3 as P_b and P_c usually lacking. Distal p. 10; 2 mm. Example of pinnulation:

I 1—2 { Br 1—2 3 + 4 5 6 7 8 9 10 11 12 13 + 14 . . . 20 — 21 29
Br 1—2 3 + 4 5 6 7 8 9 10 11 12 13 14 15 16 + 17 . . 22 — 23 . . 27

Orals h = 1/4 of the radius of the disk, only the acute angle remaining (the base and the inner parts resorbed).

With regard to the number of the cirrals this species is most closely related to *Si. diadema*, but well separated from this by the formation of Cd, by the shortness of the cirri, when compared with the arms (the latter are at least twice as long as the cirri) and by the large and many prominences on the ossicles of the arm-bases. By this the new species approaches *Daidalometra (hana)*, a genus properly distinguished from *Stenometra* only by a smaller number of arms. The above-described species is to a certain extent a transition-form between the above-mentioned genera.

Charitometridæ A. H. Clark.

Crossometra A. H. Clark.

Cr. septentrionalis A. H. Clark.

Fig. 77, 78.

Syn.: *Charitometra distincta* (preoccupied) 1908 A. H. Clark Proc. U. S. Nat. Mus. Vol. 34, p. 312.

Pachylometra septentrionalis 1911 A. H. Clark Proc. U. S. Nat. Mus. Vol. 39, p. 554; 1912 Crin. Ind. Oc., p. 215; 1915 Wash. Journ. Acad. Sci. Vol. 5, p. 215.

Crossometra septentrionalis 1918 A. H. Clark Siboga Exp. Vol. 42 B, p. 176.

From St. 36 = 1 specimen.

Sp. 1 (St. 36) Cd br 3 mm., h 1,5 mm., rounded conical, free dorsal surface without tubercles, 1,5 mm. C. XIX 14—16; 14—17 mm. very coarse, in a single or double whorl and 10 rows. 5th segment the longest L = 1 1/2 br. From the 8th segment a dorsal, longitudinal crista. The ventral margin of the distal segments about as long as the br. Opposing spine h = 1/3 of the br of the segment. Terminal claw curved, somewhat longer than the preceding segment.

B—s projecting as large interradial prominences. R—s: h = 1/8 br with a median tubercle. I Br 1 h = 1/5 br, laterally united, as on the proximal part of I Brax with a median tubercle. I Br 2 h = 1/3 br. II Br—s: 4 with similar median prominences. Primipostaxillaries united inside. III Br—s: 2, developed on the inner sides. These ossicles and Br 1 and 2 with still slighter median tubercles. Arms XVIII +, 70 mm., strongly wall-sided out to Br 2. The bases of P_{II} visible between the arm-bases. Br 1—12 discoidal, then oblique joints. 1st syzygy on the inner side usually between Br 1 and 2. Distally with an interval of 4 oblique articulations. Example: Br 1—2 3 + 4 . . . 11 + 12 . . 16 + 17 . . 21 + 22 . . . The distal Br-s with a low, not overlapping dorsal spine. Example of arm-branching and regeneration:

$$\text{I } 1\text{—}2 \begin{cases} \text{II } 1\text{—}\bar{2}\ 3 + 4_1 \begin{cases} \text{Br}_1\ 1 + 2\ 3 + 4_1\ 5_2\ 6_2\ 7_2 \ldots \\ \text{III}_1\ 1 + 2 \begin{cases} \text{Br}_1\ 1 + 2\ 3\ 4\ 5_1\ 6_2 \ldots \\ \text{Br}_1\ 1 + 2\ 3\ 4\ 5\ 6 \ldots 14_1 + 15_2 \ldots \end{cases} \end{cases} \\ \text{II } 1\text{—}\underline{2}\ 3 + \end{cases}$$

P_{II} 22; ± 5 mm. 1st—5th segments thickened with dorsal prominences similar to those in the fam. *Calometridæ* (cf. the figure). 1st segment L = 1/2 br. The 7th and following segments more slender, a little flattened. Distal segments: L ≧ br. P_1 ± 18; 4 mm., P_2 14; 3,2 mm. Distal p. 13—14; 4,5 mm. (The first 2 and last 2 segments short, the other ones L = 2 — 2 1/2 br).

Disk very closely and coarsely granulated, »lean», somewhat incised, diam. 4 mm., not completely regenerated, dark-brown. The animal otherwise white (in spirit).

The above-described specimen is as a young of *Cr. septentrionalis*.

Though the species-name *Cr. distincta* is older still, in conformity with A. H. Clark, I do not wish to use it, partly because it is a nomen nudum, partly because the name *distincta* was given by P. H. Carpenter to a species in the closely-related genus *Pachylometra* (Clark did not separate this genus from *Crossometra* before 1918).

Perissometra A. H. Clark.

P. aranea n. sp.

Fig. 103, 104.

From St. 7 a: 1 specimen.

Sp. 1 (St. 7 a) Cd a low cone, br 2 mm. Dorsally with a central cavity and small side-cavities. C. XIV 17—21; 10—11 mm. in a single or double whorl and in 10 rows. 1st—3d segments L shorter than br. 4th one somewhat longer, 5th L = 1 1/2 br, 6th one L = 2 br, distally a little widened, with an inconspicuous dorsal spine. Then shorter segments with a dorsal spine. The cirrals from about the 9th about cubical, antepenultimate segment L = 3/4 br. Opposing spine h = 1/5 of the br of the segment. Terminal claw curved, somewhat longer than the preceding segment.

R—s narrow bands, almost concealed. 1 Br-s 1 contiguous, h = 1/4 br, with a low median carination. 1 Brax pentagonal, h = 1/3 br, with a similar, low longitudinal tubercle; a slight thickening of the distal border, the rest of the ossicle smooth; laterally flattened like

Br 1. Arms X, 70 mm. Br 1 and 2 with a carination similar to the one on the I Brachials but very much slighter. Br-s 1 inside contiguous in pairs, outside broader, as also Br 2. Syzygies: 3 + 4, 13 + 14, 18 + 19 . . . distally with an interval of about 5 oblique articulations. Br 1—10 discoidal, then irregularly oblique joints. The proximal ossicles rounded and smooth; from Br 15 a low, median, longitudinal crista, slightly projecting in lateral profile.

P_1 13; 5 mm. P_a 13; 5 mm. P_2 8—9, 3,5 mm. P_3 similar. P_1 coarser than P_2. The segments rather uniform, smooth, a little longer than broad, distally somewhat angular. P_4—P_{12} ± 10; 3—4 mm. (Proximal segments very slightly dorso-ventrally flattened). Distal p-s ± 14; 5—6 mm. (1st and 2d segments shorter and a little coarser than the following ones, which have the L = 2 br).

Disk a little incised, with large calcareous granules, diameter 4 mm., colour brown. Otherwise the animal is light yellow-brown.

This new species resembles most closely *P. lata* from which, however, it differs sharply by the cirri, very short in comparison with the arm-length but in spite of this with relatively many segments, by the rather smooth proximal arm-parts, and, above all, by the proximal pinnules, which have a few, rather long pinnulars.

After a comparison with specimens of Dr Mortensen's collection I am convinced that this species often has XI or XII arms attaining a length of > 70 mm. II Br-s are 2. P_1 might get 15 segments and attain a length of ± 6 mm. P_2—P_{10} are short, with the 5—6 first segments somewhat thickened in dorsal view.

In the short genital pinnules has the species an unusual resemblance to a spider, whence the name.

Diodontometra n. gen.

This exeedingly peculiar type of the family *Charitometridæ* resembles the genus *Charitometra* by the strongly expanded proximal segments on the genital pinnules. From this genus it differs, however, in several characteristics. The arms are XX, the II Br-s: 2. Cd is high and pointedly conical and the cirri arranged in radial groups, separated by large interradial interspaces. And, finally, the opposing spine is divided into two prominences standing side by side and usu-

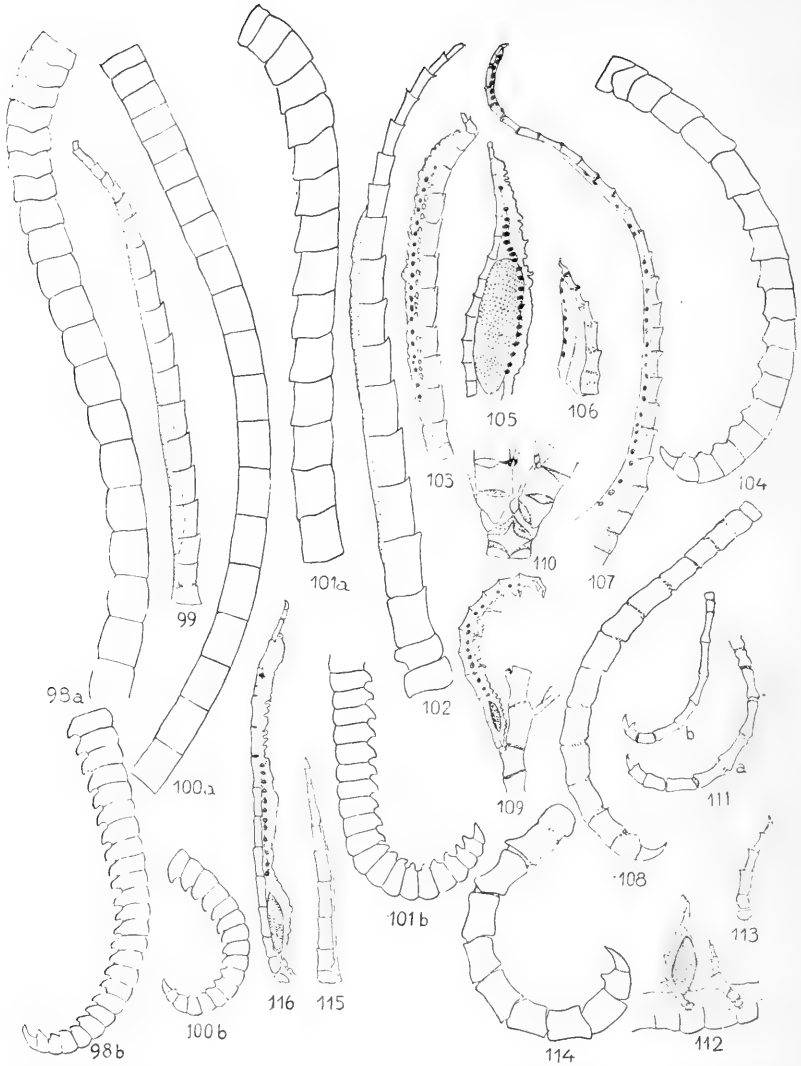

Fig. 98) *Asterometra anthus* a) The proximal, b) the distal part of a cirrus; some of the proximal segments with a slight dorsal spine $^{7}/_{1}$; 99, 100 *Asterometra macropoda* (St. 12). 99) Distal pinnule $^{9}/_{1}$. 100 a) The most proximal 20 segments, b) the distal segments of a cir-

ally flanked by an additional side-spine on each outer side. (A bifucated opposing spine has been previously noticed only in the genus *Epimetra* fam. *Colobometridae*).

D. Bocki n. sp.

Fig. 79—84. Photo 10.

From St. 56: 1 specimen.

Sp. 1 (St. 56) Cd pointedly conical, h 3,5 mm., br. 3 mm.

C. XXVI 10—12 (D) 15—17 (V); 5—6 or 15—20 mm. respectively, in 3—4 whorls. The cirri are arranged in 5 radial groups separated by interradial interspaces which are almost as broad as the area occupied by the C. In each group 5—6 cirri, often forming an almost single row. 1st and 2d segments short, 3d cubical, 4th increasing, 5th—7th L = 1 2/3 br, 8th(—9th) — the antepenultimate segment not much longer than broad. The dorsal surface of the distal cirrals slightly carinated and overlapping. No dorsal spine. Opposing spine in the distal part of the penultimate segment, large, in the middle deeply incised and therefore bifurcated, on the lateral sides moreover often a small additional spine. Terminal claw slender, curved, pointed, longer than the preceding segment.

R—s visible as narrow bands in the corners. I Br 1 h = 1/4 br, in the basal half laterally grown together, at the middle somewhat narrower because of the synarthrial tubercle from I Brax. I Br 2, pentagonal, h = 1/2 br as the preceding ossicle with a slight median carination, the rest of the ossicle rounded dorsally. The II Br-s are 2, similar to the I Br-s. Primipostaxillaries in the basal half grown together in pairs. Arms XIX + (probably originally XX), 60 mm., in 4 cases broken between I Br 1 and 2 (the synarthrial articulation well

rus 7/1; 101, 102 *Pterometra trichopoda* (St. 45) 101 a) The 15 most proximal cirrals, with a ventral spine from the 4th—the 12th segments b) The 20 most distal cirrals 9/1, 102) Distal pinnule 14/1; 103, 104 *Perissometra arancа* (St. 7 a, Sp. 1) 103) Distal pinnule 14 1, 104) Cirrus 9 1; 105—108 *Compsometra serrata* (St. 25, Sp. 3) 105) Genital pinnule 14/1, 106) P_2 (observe the indistinct stripe under the sacculi; a rudimentary genital cord?) 14/1, 107) P_1 14 1, 108) Cirrus 14 1; 109—113 *Compsometra parviflora* (St. 47) 109) A stump of the arm with a distal pinnule 14/1, 110) The base of an arm from I Br 1—Br 5 14/1, 111) Cirri a) St. 47, b) from the dorsal whorl of a specimen from St. 45; long cirrals 14/1, 112) Br 4—8 with P_2 and P_3 14 1, 113) P_1 14/1; 114—116 *Toxometra æquipinna* (St 4, Sp. 1) 114) Cirrus 14/1, 115) P_3 14 1, 116) Distal pinnule with a small genital gland 14/1.

developed). Br 1 and 2 with a slight synarthrial tubercle. Arms out to Br 4 laterally flattened. Br 5—10 with the distal ends a little overlapping. The 12 first Br-s discoidal, then oblique joints. The distal segments smooth. 7—8 of the distal Br—s supporting rudimentary pinnules. Ex. of syzygies:

Br 1—2 3—4 . . . 21 + 22 . . . 31 + 32 . . . 41 + 42 . . .
Br 1—2 3—4 . . . 17 + 18 . . . 26 + 27 . . . 35 + 36 . . . 44 + 45 . .

P_1 13; 3,5 mm. P_2 12; 4,5 mm. P_3 11; 4 mm. P_4 10; 3,5 mm. The segments on P_1—P_2 or P_3 rather uniform, L = 1/2 — 1/1 × br. On the outer sides of the 3d and following pinnulars small wings partly caused by small notches between each segment. From P_3 — about P_{12} (10—11 segments, L 3,5—4 mm.) the 3d—5th(or 6th) segments are flattened dorso-ventrally, cupular, with winglike borders, the 7th—11th pinnulars are narrow and long again. The cupular segments are in dorsal view about cubical, the distal ones L = 2 br. Distal p. 11; 4 mm. (1st segment short, 2d cubical, 3d—10th L = 1 1/2 br, last segments short, all segments smooth).

Disk thrown off. The colour of the animal light brown; sacculi rather sparse.

Antedonidæ A. H. Clark.

Antedoninæ A. H. Clark.

Compsometra A. H. Clark.

C. parviflora A. H. Clark.

Fig. 109—113.

Syn.: *Compsometra parviflora* 1912 A. H. Clark Notes from the Leyden Mus. Vol. 34, p. 133; 1918 Siboga Exp. Vol. 42 B, p. 207.

From St. 44 (1), 45 (2), 46 (1), 47 (2), 54 (1) = 7 specimens.

Sp. 1 (St. 46) Cd: br about 1,4 mm. C. + XXXV 9—10; 2—2,5 mm. in two close whorls. 3d—5th segments very much hour-glass-shaped, L = 2 1/2 — 3 × the distal diameter. The distal cirrals of more uniform thickness. The 7th segment L = 1 1/2 br.

Axillary h = 1/2 br, rhombical, the proximal angle covering a part of I Br 1. The axillary is broader than I Br 1. Br-s 1 inside well separated. Arms X, 20 mm.+, but not very much longer.

P_1 10; 4 mm. (a distal, spiny whorl from the 6th pinnular), P_2 7; 2 mm., without genital gland, P_3 7; 2 mm. with a genital gland from the 3d—the 5th segment. P_8 13; 4 mm. (1st and 2d segments short, the other ones long).

Disk 4 mm. Anal funnel long.

Sp. 2 (St. 47) C. XXXVII 8—11; 2—4,5 mm. (4th cirral the longest, L = 3 — 4 × br). R—s concealed. Axillary h = 2/3 br with strongly concave distal margins. Br-s 1 basally contiguous inside, h of the outer border 1/2, of the inner one 1/4 × br. Arms X, 25 mm.

P_1 7—8; 2 mm. (The L of the segments with the exception of the two first and the very last ones 2—3 × br), P_2 6; 1,2 mm. P_3 8; 2,2 mm. with a genital gland, P_4 8; 2,2 mm. Distal p. 14; 4 mm.

Sp. 3 (St. 47) C. XXXI 9—10; 2,5—3,5 mm.

Axillary as in the preceding specimens. Arms broken, probably between 20 and 25 mm.

P_1 8; 3 mm. (3d segment L = 2 1/2, 4th one L = 3 1/2 br) P_2 5—6; 1,2—1,5 mm. P_3 7; 2 mm. No pinnules genitally swollen.

Disk 1,8 mm. Parasitical *Myzostomids.*

Sp. 4 (St. 45) C. about XXV on a hemispherical Cd; arranged in two whorls: 9—11; 2—4,5 mm. The segments very pronouncedly hour-glass-shaped, those before the antepenultimate cirral L = 2 br, antepenultimate segment L = 1 1/2 br. Cirri from the dorsal whorl with very much longer segments (cf. the figure 111), in this case the terminal claw and opposing spine are relatively large.

I Br 1 h = 1/6 br. Axillary rhombical, h = 1/2 br (lower, and with smaller lateral angles than in the preceding specimens). Arms X, 15 mm. +. Br-s 1 inside basally contiguous. Syzygies with an interval of 3 oblique articulations. Br-s rather smooth.

P_1 8; 1,5 mm. P_2 6; 1 mm. P_3 7—8; 1,8 mm. with a genital gland. Disk 2,5 mm. Anal cone 1,3 mm.

Sp. 5 (St. 45) C. ± XXV 10—11; 2—3 mm. (4th segment L = ± 4 × br). Arms about 15 mm. P_1 6; 1 mm. P_2 4; 0,5 mm. or lacking. Disk 1 mm. No gonads developed.

Sp. 6 (St. 44) Cd with scars of about XXV C. Arms X, broken, 3 mm.+. I Br 1 h = 1/5 br with a thickened rim against the R. Axillary h = 1/3 br, rhombical. P_1 7; 1,2 mm. P_2 4—5; 0,8 mm. P_3 6; 1,2 mm.

Sp. 7 (St. 54) Cd 0,5 mm. low, rounded, with scars of about XXXV C, arranged in 3 whorls. The central, dorsal pole is occupied by a small rounded star with a scar of the central canal of the stem. — R-s at the rim of Cd. I Br 1 h = 1/4 br, latero-distally squeezed together. Axillary h = 1/2 br, rhombical with one proximally and one distally directed lappet. Arms X, about 5 mm. Br-s 1 inside contiguous, h = 1/6 br, on the outer side twice as broad. Br 2 with a backward directed synarthrial prominence.

P_1 7; P_2 5, shorter, P_3 7, about as long as P_1; P_4 sometimes missing.

The above-described specimens agree well with A. H. Clark's descriptions of *C. parviflora*. By my specimens the cirrals are a little shorter; one may, however, also find cirri with longer segments, as my figure of a cirrus from Sp. 4 shows.

None of these 7 specimens has a genital gland on P_2, contrary to the type specimen from the Siboga St. 50. From some other Siboga-localities, however, there are specimens with a gonad first on P_3, as in the Bockian specimens. Might this difference perhaps have the value of variety? The disparity is probably not a difference of age, since for instance Sp. 2 is completely mature and nevertheless has no trace of a genital gland on P_2.

Compsometra serrata A. H. Clark.

Fig. 105—108.

Syn.: See 1918 A. H. Clark Siboga Exp. Vol. 42 B, p. 209.

From St. 1 (4), 2 (3), 3 (1), 21 (1), 22 (3), 23 (1), 25 (3), 26 (2) = 18 sp.

Sp. 1 (St. 25) Cd hemispherical. C. XXIII 12—15; 7 mm. in a single or double whorl. 4^{th} and the following segments a little squeezed together in the middle. L = 1 1/2 × the distal br. Antepenultimate segment L = 1 1/2 br. Penultimate one with a very inconspicuous op-

posing spine. Terminal claw narrow, curved, somewhat longer than the preceding segment.

R—s concealed. I Br 1 h = 1/3 br, laterally almost free. The axillary h = 1/3 — 1/2 br, triangular. Arms X, + 25 mm. Br-s 1 united inside in pairs, like the following ossicle on the outer side twice as broad. Br-s 2 on the inner side separated by a rather wide interspace. The first 8 Br-s discoidal, then oblique joints. Ex. of syzygies: 3 + 4, 9 + 10, 13 + 14, 17 + 18 . . etc. Arms rather smooth.

P_1 15; + 5 mm. 1st and 2d segment short, the other segments L = 2 — 2 1/2 br, the distal parts widened, spiny. P_2 9; 2,3 mm. The proximal cirrals with strongly spiny borders. P_3 (11; 3,5 mm.)—P_5 with a similar dorsal carination on the 6 first segments. From P_3 there is a large genital gland. Genital p. 13—15; 4 mm. The dorsal carination of the proximal pinnules continues at least out to P_{10}, then more indistinct.

Disk 3 mm., white-coloured, without granules, a little swollen. The arms darker. Each cirral with a dark spot proximally.

Sp. 2 (St. 25) The cirrals somewhat more hour-glass-shaped. Syzygies with an interval of 3—4 oblique articulations. P_3 and the following ones with a gonad. P_1—P_6 with strong spiny whorls on the distal parts of the 2d—5th segments. For further details see the table.

Sp. 3 (St. 25) I Br 1 h = 1/6 br. Syzygies, as in Sp. 2. P_3 and the following pinnules with a genital gland. Colour: somewhat more red-brown than in the preceding specimens.

Sp. 4 (St. 1) The syzygies, as in sp. 5—8, with an interval of 3 oblique articulations. Cirri more than in the preceding specimens, in a double whorl. P_1 and the following ones with very large spiny prominences. P_3 9; 3 mm. Disk 5 mm. Colour reddish.

Sp. 5 (St. 1) Cirri arranged in about 3 whorls. P_3 as in sp. 4.

Sp. 6 (St. 1) P_3 8; 2,5 mm. Disk 4,5 mm.

Sp. 7 (St. 1) Cirri in a double, incomplete whorl. P_3 7; 2 mm.

Sp. 8 (St. 2) Cirri in a partly double whorl. P_4 11; 3 mm. with a genital gland. P_3 small. Anal cone large. Disk 5 mm. lighter than the red-grey arms, which dorsally have greyish segments and light articulations.

Sp. 9 (St. 2) P_3 with a gonad. Disk 4,5 mm.

Number of Specimens and Stations	Cirri			Arm-length	P_1		P_2		P_3		Dist. p.	
	N	S	L		S	L	S	L	S	L	S	L
Sp. 1 (St. 25)	XXIII	12—15	7	25	15	± 5	9	2,3	11	3,5	15	4
Sp. 2 (St. 25)	XXIII	9—12	3,5—4,5	20	12	3,5	6	1,5	—	—	9	2
Sp. 3 (St. 25)	XXVI	12—15	6,5—7,5	35	23—28	8—10	9	2,5	12	3,5	18	5
Sp. 4 (St. 1)	XXXVIII	12—14	4—8	35	23	10	8	3	10	4	16	5,5
Sp. 5 (St. 1)	XLV	11—14	6—7	40	21	9	10	3	11	4	—	4,5
Sp. 6 (St. 1)	XLI	11—14	4—7	35	28	11	9	3	12	4	16	4,5
Sp. 7 (St. 1)	XVIII	11—12	4—5	15	16	5	8	2,2	10	3,5	—	3,5
Sp. 8 (St 2)	XXXI	11—14	4—7	30	± 20	6	7	2	9	2,5	—	4
Sp. 9 (St. 2)	XXVII	11—13	5	20	± 18	5	6	1	8	2	16	3,5
Sp. 10 (St. 2)	XXXII	11—13	± 5	25	17	4	9	2	9	2,2	—	3,5
Sp. 11 (St. 3)	XXV	11—13	7	30	13—15	4,5	9	2,5	11	± 4	17	4
Sp. 12 (St. 23)	XXII	12—13	5—6	25	20	6,5	8	2,5	11	3,5	—	3
Sp. 13 (St. 26)	XXIV	11—13	—	27	15—20	4—6,5	7	2	9	± 3	± 15	4
Sp. 14 (St. 26)	XXXII	11—13	5—6,5	± 20	16	6	8	2,2	—	—	± 18	4,5
Sp. 15 (St. 22)	—	12	5	25	12—16	3—4	8	1,3	—	—	—	2,5
Sp. 16 (St. 22)	—	12	5	25	17	4,5	8	2	—	—	—	3
Sp. 17 (St. 22)	XII	9	1,2	3,2	—	—	—	—	—	—	—	—
Sp. 18 (St. 21)	XIX	9—10	1,5	5	—	—	—	—	—	—	—	—

Sp. 10 (St. 2) P_4 12; 4 mm., like the following ones with a gonad. Disk 4,5 mm., dark brown.

Sp. 11 (St. 3) P_3 and the following ones with a genital gland. The specimen is a ♀ with many eggs fixed outside the pinnules. Syzygies with an interval of 3—4 oblique articulations. Disk 7 mm.

Sp. 12 (St. 23) P_2 8; 2 mm. Disk 6 mm. Colour: greyish red-violet.

Sp. 13 (St. 26) As is obvious from the table, the L of P_1 is very variable. P_2 7; 2 mm. A genital gland from P_4. The proximal parts of the Br-s darker than the distal parts and by this the arms get a spotted appearance. This condition also often in the preceding specimens. A light longitudinal stripe on the dorsal side of the arms.

Sp. 14 (St. 26) Disk 5 mm. A light-coloured specimen.

Sp. 15 (St. 22) A genital gland from P_3. Disk 3,5 mm. Anal cone 2 mm. swollen at the base.

Sp. 16 (St. 22) Disk 4 mm., anal cone 3 mm. Colour: spotted in light olive-brown and dark-violet (specimen in spirit).

Sp. 17 (St. 22) After P_1 a large pinnule-gap. B-s visible as small tongues IR. Small curved remains of the orals.

Sp. 18 (St. 21) All the proximal pinnules present, though P_2 and P_3 especially are very small and incompletely calcified. Disk swollen. No orals.

The specimens from Shimonoseki (St. 1) obviously differ from the other ones by having more cirri; they are also a little larger and coarser than the rest of the specimens.

It is interesting to observe the great variability in the number of pinnulars and relative lengths of the proximal pinnules.

Toxometra A. H. Clark.

T. æquipinna n. sp.

Fig. 114—116, Photo 11.

From St. 4: 2 specimens.

Sp. 1 (St. 4) Cd almost discoidal, free dorsal pole ± 1 mm. — C. XXVIII 10—11, 5—6,5 mm. in a double whorl. 1st segment L = 1/2 br, 2d one L about = br, 3d and the following ones L = 1 1/3 — 1 1/2 × the median br. No dorsal spine. Antepenultimate segment L= br. Opposing spine h = 1/3 of the br of the segment. Terminal claw curved, a little longer than the penultimate segment.

R—s narrow bands (the distal borders concave), almost concealed by Cd. I Br—s 1 laterally free, h = 1/5 br, with a small lateral tubercle and a strong, median, longitudinal crista which continues on the proximal 2/3 of the axillary. This ossicle is hexangular, h of the middle line 2/3 of the br. The distal margin concave. The proximal and distal edges strongly bent outwards. Arms X, 65 mm. Br—s 1 inside basally contiguous in pairs. Br 1 and 2 with a median tubercle similar to the crista on the I Br series, but more slightly developed than this. After Br 9 oblique joints. All the distal edges of the segments strongly bent outvards, a little proximally directed and finely spinous. This condition most pronounced on the proximal segments. The distal Br—s long (L = 1 1/2 — 2 br) somewhat hour-glass-shaped. Ex. of syzygies: 3 + 4, 9 + 10, 14 + 15, 19 + 20 etc. with an interval of usually 3 oblique articulations.

P_1 8—9; 3 mm. (3d and 4th segment the longest, L = 2 br, all the segments smooth), P_2 11; 4 mm. similar to P_1, but coarser, P_3 10; 3,3 mm. P_4 9; 2,2 mm. with a genital gland from the 4th to the 6th segment, much more slender than the preceding ones. Then the pinnules increasing again. P_a 8; 2,3 mm. P_b 8; P_c 8 about as long as P_a. The distal p. 16—17; 6,5—7 mm. (the 3 first pinnulars rather short, the other ones L = 3 — 4 × br, a little swollen at the joints).

Disk dark brown, otherwise the animal is light brown (in spirit).

Sp. 2 (St. 4) C. XIV 10—11; 4—5 mm.

I Br 1 h = 1/4 br, with a dorsal tubercle (not a crista) together with the axillary. Arms X, 40 mm. P_1 8; 2,2 mm. P_2 9—10; 2,7 mm. P_3 8; 2 mm. P_a 6; 2 mm. Distal p. 5 mm.

The specimen sticking to a calcareous sponge.

The placing of this species has caused some trouble.

A. H. Clark, whom I have consulted about this question, writes: »Your new antedonid from Japan may very well be a new species of the genus *Argyrometra*, now known from Hawaii and from New Zealand. The occurrence of this genus in southern Japan is highly probable. This genus belongs to that section of the Antedoninæ in which P_3 is similar to the succeeding pinnules. There are two species *A. mortenseni* from New Zealand and *A. (»Compsometra») crispa* from Hawaii. Smaller species of this genus may well have a more or less discoidal centrodorsal. The large size of P_3 seems to be an especially well marked character both of *Toxometra* and *Dorometra*».

I cannot believe that the species in question ought to be referred to *Argyrometra*. Cd in this genus is conical already at an arm-length of 30 mm. and my species, which has an almost discoidal Cd, is not a smaller species of this genus but has an arm-length of 65 mm. The number of cirri does not amount to XXX; it might have been larger if the species had been a large form of *Argyrometra*, where even small species with an armlength of 30 mm. have a number of LX—LXXX. P_3 has not the same character as the following pinnules, which are genital pinnules and, finally, the Br-structures does not resemble that of *Antedon petasus* but much more that of *Toxometra*.

The above-described species differs from *Toxometra* by the 3 first pinnules, which are of about equal length, and in this it resembles *Andrometra psyche* (and *Iridometra*). The genus *Andrometra*, how-

ever, has a conical Cd, while the above-described species, like *Toxometra paupera*, has a discoidal one. (*Iridometra* has smooth arms and at least 13 segments on P_1-P_3.) — To the relation between the relative length of the proximal pinnules is, generally, attached a rather great value in judging the genera within the *Antedonid* family. When characterizing the genus *Toxometra* A. H. Clark says that P_3 should be the longest p. The case in question shows that one must be rather cautious in using such a character as a generic mark. If my species really belongs to *Toxometra* then P_3 is the longest pinnule only in *T. paupera* and may not be used as a mark of genus. A comparison between the different species described as *T. paupera* shows, moreover, that within this species too there is rather great variability in the relative length of the proximal pinnules. The largest specimen has P_1 15; 5,5 mm., P_2 16; 7,5 mm. and P_3 22; 12—13 mm., the smallest one with an arm-length of 80 mm. has P_1 12; 4,5 mm. P_2 14; 6 mm. P_3 17; 7—7,5 mm. With shorter arms we therefore get a proportionally greater abbreviation of P_3 than of P_1 and P_2 within this species. (Cf. p. 76). I have also demonstrated the same general rule concerning P_2 in *Cyllometra pulchella*.

Nevertheless, because of the following facts, I have not thought the specimens in the Bockian collection to be young forms of *T. paupera*. 1) The cirrals are somewhat shorter than in the species mentioned (if we had been concerned with a young form, they ought to be longer). 2) The distal pinnules are longer than in *T. paupera* when compared with the arm-length. 3) The genital glands are rather well developed. 4) The photo in the Siboga work shows that *T. paupera*, though very much larger than *T. æquipinna*, has smaller prominences on the Br-segments (if the last-mentioned species had been a young form, the condition ought to have been the reverse), and 5) the geographical distribution is rather different, as *T. paupera* is only noted from the Sunda Islands and the Philippines.

Iridometra A. H. Clark.

I. melpomene A. H. Clark.

Fig. 117—119.

Syn.: *Iridometra melpomene* 1911 A. H. Clark Proc. U. S. Nat. Mus. Vol. 39, p. 559; 1912 Crin. Ind. Oc. p. 230; 1918 Siboga Exp. Vol. 42 B, p. 212.

From St. 32 (1), 37 (1) = 2 specimens.

Sp. 1 (St. 32) Cd low, bluntly conical. C. XXXII 10—18 (usually 17—18), 9—11 mm. (The dorsal C. with 10 segments, 2 mm). 1st and 2d segments short, then the L = 2 — $2^1/_2$ br. The segments distally much broader, not hour-glass-shaped. No dorsal spine. Antepenultimate segment L = $1^3/_4$ br. Penultimate segment L = $1^1/_3$ br, with an opposing spine, h = $^1/_3$ of the br of the segment. Terminal claw slightly curved, somewhat shorter than the preceding segment.

R—s not very visible. I Br 1 h = $^1/_4$ br, a little narrower at the middle because of the slightly backwards directed synarthrial tubercle on I Brax. I Br 2 L = br, rhombic, with a long, low carination on the synarthrial tubercle, the distal angle prolonged. Arms X, + 40 mm. Br—s 1 basally united inside; Br 2 considerably longer than the preceding ossicle, with a proximal border of the same form as in I Br 2, inside widely separated. Ex. of syzygies: 3+4, 9+10, 14+15 etc. with an interval of about 3 oblique articulations. The distal parts of the arms smooth.

P_1 14—15; 5,5—6 mm. P_2 14—15; 6—6,5 mm., P_3 13; 6 mm. All these p-s very slender, the two first segments short, the following ones L = 3 br. P_4 8—11; 4 mm. with a genital gland. Distal p-s 16; 6,5 mm.

Disk without calcareous granules, 4,8 mm. Anal cone 2,7 mm. Colour: arms white with red transverse bands.

Sp. 2 (St. 37) C. XXXVIII 10—16; 3—8 mm. Arms X, 37 mm. P_1 12; 5,5 mm. P_2 11; 5 mm. P_3 10, 5 mm. P_4 10, with a genital gland from the 3d—6th segment. Distal p. ± 15; 5,5 mm.

On account of the few segments of P_1 and P_2 and the relatively short P_3 the above-described specimens appear to come next to *I. melpomene*, previously found at Hongkong. *I. adrestine* is a not very different species from south Japan. It is distinguished by some more

(18—20) pinnulars on P_1—P_3, ($P_3 > P_2 > P_1$), and usually has somewhat fewer cirrals. An examination of more ample material will probably show that the two forms belong to the same species.

A. H. Clark 1918 in the Siboga work gives *Antedon minuta* as a synonymous form of *I. adrestine*. If this is correct there might be a mistake in the description of the first-mentioned species. *I. adrestine* is said to have P_1 19; 10 mm. and in this case *A. minuta* can scarcely have P_1 18; 3 mm. because of a rule that one always finds verified in the examination of growth-series of Crinoids and that runs thus: Length and number of segments of a cirrus, an arm or a pinnule stand in a certain relation to the ontogenetical development and in a certain relative proportion, viz. that younger specimens have shorter cirri, arms, and pinnules and fewer cirrals and pinnulars, than the full-grown ones. The figures obtained by these characteristics are rather constant in relation to one another at a given size and when compared with the same characteristic in older and younger individuals of the same species they can be fitted into an arithmetical series.

Dorometra A. H. Clark.

D. nana (Hartlaub).

Fig. 123, 124.

Syn.: See 1918 A. H. Clark Siboga Exp. Vol. 42 B, p. 216.

From St. 41: 3 specimens.

Sp. 1 (St. 41) The free, flat, dorsal pole of Cd about 0,5 mm. C. LI 10—14; 4—8 mm. 1st segment short, 2d cubical, 3d L = $1^1/_2 - 2 \times$ br, 4th—7th segment: L = $2 - 3 \times$ br, then shorter again. Antepenultimate cirral L = $1^1/_2$ br, penultimate segment L = $1^1/_3$ br, with a pointed opposing spine, h = $^1/_2$ of the br of the segment. Terminal claw curved, somewhat longer than the preceding segment.

I Br 1 almost concealed by Cd. Axillary rhombic, h = $^2/_3$ br with a slight synarthrial tubercle in the proximal part. Arms X, 30—35 mm. Br—s 1 basally united inside. Br 2 with a small, backward directed synarthrial tubercle; this ossicle is narrower than Br 1, by which a broad interspace (= $^1/_2$ of the br of the arm) arises between the arm-bases. Syzygies: 3 + 4, 9 + 10, 14 + 15 etc. with an interval

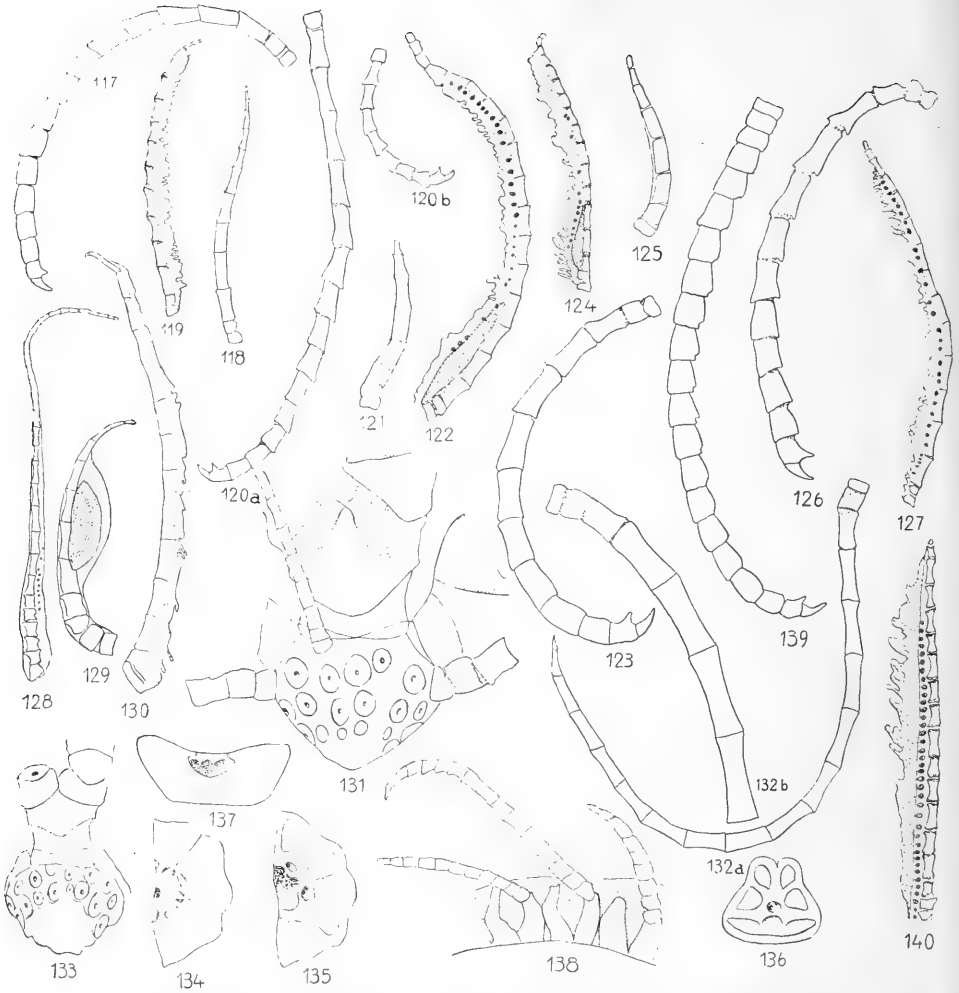

Fig. 117—119 *Iridometra melpomene* (St. 32) 117) Cirrus $^{9}/_{1}$, 118) P_1 $^{9}/_{1}$, 119) Distal pinnule $^{9}/_{1}$; 120—122 *Dorometra briseis* (St. 37) 120) Cirrus a) long one (from the ventral whorl), b) short one (from the dorsal whorl) $^{9}/_{1}$, 121) P_1 $^{14}/_{1}$, 122) Distal pinnule $^{14}/_{1}$; 123, 124 *Dorometra nana* (St. 41) 123 Cirrus $^{14}/_{1}$, 124) Distal pinnule $^{9}/_{1}$; 125—127 *Dorometra parvicirra* 125) P_1 (St. 53), × 17 $^{1}/_{3}$, 126) Cirrus (St. 47) $^{14}/_{1}$, 127) Distal pinnule (St. 53) $^{14}/_{1}$; 128—132 *Psathyrometra Wireni* (St. 6) 128) P_1 $^{14}/_{1}$, 129) P_2 with a genital gland from the 5th—8th segments $^{14}/_{1}$, 130) Distal pinnule $^{14}/_{1}$, 131) Cd with the cirrus-groups and the bases of the arms $^{14}/_{1}$. 132 a) A younger and more slender but complete cirrus, b) the 7 first segments of an out-grown cirrus $^{14}/_{1}$; 133—140 *Cyllometra pulchella* (St. 13) 133) Cd with the cirrus-sockets and an arm-base $^{9}/_{1}$, 134) The proximal faces of the radials and half of the rosette $^{14}/_{1}$, 135) Half Cd seen from the ventral side $^{14}/_{1}$, 136) The distal articulation of the R $^{14}/_{1}$, 137) Half of Cd in lateral view, showing the central cavity $^{14}/_{1}$, 138) Br 2—8 with P_1—P_3 $^{9}/_{1}$, 139) Cirrus $^{14}/_{1}$, 140) Distal pinnule $^{14}/_{1}$.

of 3 oblique articulations. The segments are smooth, rather short, never much longer than broad.

P_1 11; 3 mm. P_2 and P_3 broken. P_a 9; 2,5 mm. P_b 10, of about the same length or a little longer. P_c 13; 5 mm. much larger and coarser than P_1 and P_2, like these p—s rather smooth. P_c with a small genital gland. P_d and the following ones about 3 mm. Distal p. 15—17; 4,5—5,5 mm.

Disk somewhat swollen with a smooth, ungranulated skin, pentagonal, 5 mm. Colour: like the specimens of the Siboga Expedition with close, small spots of violet-brown on white ground, the soft parts olive-brown (specimens in spirits).

Sp. 2 (St. 41) C. XLIX 12—14; 4—9 mm. Arms X, broken.

P_1 10; 3 mm. For the rest as the preceding specimen.

Sp. 3 (St. 41) C. about L 10—12; 4—8 mm. Arms X, 35 mm. Syzygies as before. P_1 8; 3 mm. P_2 6—8; 2,7 mm. P_3 15; 6 mm. P_4 12; 3,7 mm. Distal p. ± 16; 5 mm.

Disk 5 mm. Somewhat smaller spots, appearing only at the articulations, by which the specimen seems to be lighter.

Differs from *D. nana* only by greater number of cirri and by the Br—s 1, which are basally united inside.

Dorometra briseis A. H. Clark.

Fig. 120—122.

Syn.: *Antedon briseis* 1907 A. H. Clark Proc. U. S. Nat. Mus. Vol. 33, p. 83.
Iridometra briseis 1908 A. H. Clark Wash. Proc Biol. Soc. Vol. 21, p. 131; 1912 Crin. Ind. Oc., p. 231; 1915 Wash. Journ. Acad. Sci. Vol. 5, p. 215.
Dorometra briseis 1918 A. H. Clark Siboga Exp. Vol. 42 B, p. 216.

From St. 35 (1), 37 (2) = 3 specimens.

Sp. 1 (St. 37) C. XLVII 10—17; 3—11 mm. 1st segment L = br, 2d one L = 2 br, 3d—5th segments the longest, L = 3—3 1/2 br. The segments somewhat hour-glass-shaped, specially widened distally.

R—s indistinctly visible in the corners. 1 Br 1 h = 1/6 br, partly concealed at the middle by the tongue-like prominence from the axillary, laterally free and provided with a small tubercle. 1 Br 2 about rhombic, h = 2/3 br, with concave distal margins and a backward directed

tongue. Br—s 1 free inside. Br 2 with a backward projecting prominence, similar to that of the axillary. Arms X, 40 mm. smooth; the syzygies: 3 + 4, 9 + 10, 16 + 17 etc. with an interval of 3 oblique articulations. The longer side of the proximal Br—s L about = br, on the distal segments L = 1 1/2 br.

P_1 8; 2,7 mm., P_2 8; 2,5 mm., P_3 13; 4,7 mm., P_6 14; 5,5 mm. Distal p—s ± 18; 6,5 mm.

Colour: yellow-white; the arms with transverse bands of brown-red *large* spots.

Sp. 2 (St. 37) C. XXXIV 9—12; 2—7 mm. Arms X, 20 mm.

P_1 7; 2,2 mm., P_2 7; 2 mm., P_3 10; 3 mm. Distal p—s 15; 5 mm.

Sp. 3 (St. 35) C. about XXXV 11—14; 6—10 mm. built as before. H of the opposing spine 2/3 of the br of the segment.

Axillary with concave distal margins, h = 2/3 br. Br—s almost free inside, twice as broad on the outer side; the outer half partly hidden by the backward directed tongue from Br. 2. Arms X, 45 mm. Syzygies with an interval of 3(—4) oblique articulations.

P_1 9—10; 3—3,5 mm., P_2 8—9; 2,5—3 mm., P_3 11—12; 4,2—5 mm. P_4 10; 4,5 mm. with a genital gland. Distal p. 17; 5,5 mm.

Disk 5 mm. Colour as before.

All these specimens differ from *D. briseis* by having more cirri and by longer P_3, by which they resemble *D. nana*. Nevertheless the size of P_3 in the latter species always differs much more from the other p—s than in *D. briseis*, the cirrals are shorter in *D. nana* (cf. the descriptions of the two species), and the colour seems to be consistently different, as *D. nana* has small, closely-arranged spots, while *D. briseis* has some few, large dark flecks separated by large white parts of the arms and pinnules.

Dorometra parvicirra (P. H. Carp.)

Fig. 125—127.

Syn: See 1918 A. H. Clark Siboga Exp. Vol. 42 B, p. 216.

From St. 47 (1), 53 (1) = 2 specimens.

Sp. 1 (St. 53) Cd hemispherical. C. about XXX, fallen. Cirrus-sockets arranged in two irregular whorls. A loose cirrus 14; 5,5 mm.

3d and 4th segments the longest ones, L = 2—2 1/2 br, like the preceding ones a little hour-glass-shaped. Antepenultimate segment L = 1/2 br. Opposing spine h = 1/2 of the br of the segment. Terminal claw narrow, pointed, somewhat curved, as long as the penultimate segment.

R—s h = 1/7 br. I Br—s 1 h = 1/3—1/5 br, laterally free, but in close contact by a small, lateral tubercle, at the middle partly hidden by the synarthrial tubercle from the axillary. Axillary rhombic, h = br. The lateral angles a little pointed by a small prominence. Arms X, broken, probably between 20 and 30 mm. Br—s 1 united on the inside, twice as broad on the outside, medio-laterally narrower by the tubercle from Br 2. Ex. of syzygies: 3 + 4, 9 + 10, 14 + 15 etc. with an interval of 3 oblique articulations. First 10 segments about discoidal, then oblique joints. Arms rather smooth.

P_1 8; 2 mm. (1st segment short, 2d one cubical, 3d L = 1 1/2 br, 4th—7th segment L = 2—3 × br), P_a 7; 1,5 mm., P_2 8; 2,5 mm., P_3 10; 4 mm. (The segments somewhat hour-glass-shaped, L = 3—4 br), P_4 7; 2 mm., P_5 ± 9; 3 mm. Distal p—s about 15; 5 mm. (Longest segments L = 3—3 1/2 br).

Disk 3 mm., rather much incised, granulated both IR and interbrachially. Colour: brown. — With some large *Myzostomas*.

Sp. 2 (St. 47) Cd rounded, dome-shaped, dorsally papillated. C. ± XXV, 11—14; 2,5—7 mm. in 2 or 3 whorls, 3d—6th segments the longest, L = 1 1/2, 2 and 2 1/2 × br. Opposing spine h = 2/3 of the br of the segment, directed obliquely outwards.

Axillary rhombic, h = 2/3 br, with a low synarthrial tubercle, located somewhat in front of the tongue-like posterior prominence (the same in sp. 1). Arms X, 35 mm. Syzygies as before.

P_1 9; 2,7 mm. (The L of the segments 3—3 1/2 br), P_a 7; 2 mm., P_2 10; 3,5 mm., P_3 14; 5,5 mm., P_4 9; 2,5 mm. Distal p. 16; 5 mm. (Longest segments L = ± 4 × br). The genital glands not very prominent.

Disk smooth, somewhat incised, without granules. Colour: brown. — With *Myzostomas*.

Properly speaking, the above-described specimens only differ from *D. parvicirra* (P. H. Carp.) by their smaller proportions. Therefore I have not separated them as a special variety, though the axillaries

and I Br 1 are of somewhat different form, not so much pronounced, however, in the larger specimen. These differences are therefore probably due to the animals' different ages.

Zenometrinæ A. H. Clark.

Psathyrometra A. H. Clark.

Ps. Wireni n. sp.

Fig. 128—132. Photo 12.

From St. 6 : 1 specimen.

Sp. 1 (St. 6) Cd pointedly conical, h = 2 mm., br = 2,2 mm. The cirrus-sockets in 5 radial groups, separated by narrow, interradial interspaces. Each radial group with 7—8 cirri. (The most dorsal cirrus-sockets more or less indistinct or disappeared). In each group there are two rows (with 3—4 cirrus-sockets), forming an angle with each other, and between these rows there is an incomplete one with 1—2 cirri.

Cirri fallen or broken, marks after XXXIX. A young, complete, fallen cirrus with 18 segments, 10 mm. 1st segment short, 2d cubical, 3d L = 1 3/4 br, 4th segment L = 2 1/2 br, 5th—7th cirral L = 3—3 1/2 br then slowly decreasing; antepenultimate segment L = 2 1/4 br; penultimate one L = 2 br. Terminal claw almost straight, L = 1/2 of the preceding segment (cf. the figure). The first 7 segments of a full-grown cirrus also remaining. These are larger and coarser, but otherwise of about the same proportions as in the young cirrus. (Except the 3d segment, where L = 1 1/3 br). This cirrus has probably been of a L of about 15 mm.

R—s somewhat visible in the corners. I Br—s 1 laterally free, latero-distally a little squeezed together, h = 1/4 br. Axillary h = 3/4 br, broader than the preceding ossicle, rhombic, the posterior margin slightly curved, because of the low, backward directed, synarthrial tubercle; distal tongue narrow, very much prolonged. Arms X, 40 mm., (broken, probably about 60 mm.) Br—s 1 basally contiguous inside, the outer border twice or three times as broad as the inner one. Br 2

also very much more narrow on the inside; slight synarthrial tubercle between Br 1 and 2. The distance from the R—s to the first syzygy is 3,2 mm. After Br 12 oblique joints. Ex. of syzygies: 3 + 4, 9 + 10, 14 + 15, 21 + 22 or 3 + 4, 9 + 10, 16 + 17, 20 + 21 etc. with an interval of 3 oblique articulations. The first 10 Br—s with the distal margins somewhat thickened and bent outwards; distally the arms are smooth.

$P_1 \pm 30$; 6 mm. The 5 first segments with notches (as in for instance *Ps. mira*), shorter than long to cubical; then the segments are slender, more or less hour-glass-shaped, L = 1 1/2—2 br, the whole pinnule very slender and whip-shaped, P_a similar, $\pm$ 25; P_2 11—12; 3,5—4 mm. (First 3 segments shorter than long, the following ones L = 2—2 1/2 br. From the 5th—the 8th segment a large genital gland; P_2 stouter than P_1). P_b similar, 11 segments. P_3 11; 3,7 mm. Distal p. 16; 5,5 mm. (1st and 2 segments short, 3d and the following ones long and slender, L = 2 1/2—3 br, the articulations somewhat swollen).

Disk a little incised, 4,5 mm., without granules. Anal tube 2,3 mm. The ossicles white, the weak parts yellowish (on the preserved specimen).

The above-described new species is a rather interesting type. By the formation of Cd it documents its relationship to the subfam. *Zenometrinæ*. The formation of cirri and P_1 both hint at the above-mentioned subfamily as well as the subfam. *Thysanometrinæ* (Both these characteristics are however common both to *Thysanometrinæ* and to a couple of genera in *Zenometrinæ*). And finally — and this is the really strange condition — the animal has a large genital gland on P_2, a phenomenon elsewhere found in *Ps. anomala*, in *Bathymetrinæ*, and exceptionally in *Antedoninæ* (Compare *Compsometra parviflora*). Of late A. H. Clark has shown that a genital gland on P_2 does not occur in all species of *Bathymetrinæ* (as he at first supposed), though it is a very usual characteristic in the subfamily mentioned.

It is perhaps not an accident that this characteristic, otherwise common to the *Bathymetrinæ*, is found in *Zenometrin* forms. This is an additional support for A. H. Clark's supposition (though possibly not a very important one, considering that a genital gland is also found exceptionally in the *Antedoninæ*) that the two first-mentioned subfamilies might be more closely related. To be correctly understood, I will say, however, that, contrary to A. H. Clark, I am more inclined to think

the *Zenometrinæ* to be the original type because of the formation of the Cd which probably more than that of the *Bathymetrinæ*, resembles the Cd of the more primitive (*Atelecrinoid?*) forms from which the Macrophreats originate.

The new species, which I have named after Prof. A. Wirén of Uppsala, is in other respects approaches closest to *Ps. inusitata* and *Ps. anomala.*

Perometrinæ A. H. Clark.

Erythrometra A. H. Clark.

E. rubra A. H. Clark.

Fig. 150—152.

Syn.: *Antedon ruber* 1907 A. H. Clark Proc. U. S. Nat. Mus. Vol. 33, p. 146.

Erythrometra ruber 1908 A. H. Clark Wash. Proc. Biol. Soc. Vol. 121, p. 126; Proc. U. S. Nat. Mus. Vol. 34, p. 316; 1909 Kobenhavn, Videnskabl. Meddel. p. 190; 1912 Crin. Ind. Oc. p. 233; 1915 Wash. Journ. Acad. Sci. Vol. 5, p. 215; 1918 Siboga Exp. Vol. 42 B, p. 236.

From St. 11 = 3 specimens.

Sp. 1 (St. 11) C. XX 24—25 (D), 34—36 (V); 7—11 mm. 1st and 2d segments short, 3d cubical, 5th the longest, L = 1 1/2—1 2/3 br, then slowly decreasing, 10th segment about cubical. From this segment a dorso-distal swelling on the cirrals, and this prominence gradually develops into a blunt, longitudinal crista (most prominent about 9—10 segments from the last one). Antepenultimate segment almost smooth. Opposing spine stout, h = 2/3 of the br of the segment. Terminal claw curved, L about the same as the penultimate segment.

R—s h = 1/6 br. I Br 1 h = 1/2 br, laterally almost free, though nearly standing, distally somewhat incised in the middle by the obtuse-angled proximal border of the axillary. The synarthrial swelling inconspicuous. Axillary rhombic, h = 3/4 br, lateral angles with very slight, small spines. Arms X, 25 mm. +. Br—s 1 inwardly united by pairs, outwardly 1 1/2 × broader. The proximal border of Br 2

similar to that of I Br 2. Joints after Br 10 triangular, smooth. Syzygies: 3 + 4, (9 + 10), 15 + 16, 21 + 22, distally with an interval of usually 3—4 oblique articulations.

P_1 11—12; 4,2 mm. (1st and last segments short, the other ones L = 2—2 1/2 br, smooth cirrals), P_2 11; 4 mm. (Distal segments slightly swollen and spiny), P_3 8—9; 2,2 mm., P_4 still a little shorter, then again longer p—s. Distal p ± 13; 3 mm. (1st and 2d segments somewhat stouter than the following ones), P_a usually absent. The proximal pinnules are stiff.

Colour (on preserved material) yellow-brown. Cirri white. Disk 2,5 mm., finely papillous. Anal cone narrow, L = 0,8 mm.

Sp. 2 (St. 11) C. XXXII 15—16 (D), 25—28 (V); 2,5 and 7 mm. respectively.

I Br 1 with 3 small lateral tubercles on each side. Arms X, broken. After Br 7 wedge-shaped segments. Ex. of syzygies: 3 + 4, 9 + 10, 14 + 15.

P_1 9; 3,5 mm. (Distal segments slightly collar-shaped and a little spiny). P_2 8; 2,5 mm. Similar to P_1; P_3 9, about as long as P_2. P_a absent.

Disk with large calcareous granules also interbrachially, where the perisome reaches to Br 4. Colour salmon-red. Cirri white.

Sp. 3 (St. 11) The free dorsal surface of Cd small-grained, 0,8 mm. C. XIV 17—19 in a single whorl. 4th segment the longest, with a dorsal tubercle, which at the 7th segment passes over to a stout dorsal spine, less developed on the antepenultimate segment.

Arms X, broken. Syzygies with an interval of 3—4 oblique articulations.

P_1 11; 3 mm. P_2 11; 4,2 mm. (the distal borders of the pinnulars with small spines), P_3 9; 3 mm., P_4 10; 2 mm., P_a absent.

Colour white, with pale pink spots on the arms.

Though the above-described specimens differ from *Erythrometra rubra* by having almost smooth arm-bases and proximal pinnules, I have referred them to this species, as the other characteristics coincide, and considered the differences to be ascribable to different ages in my specimens and those described of A. H. Clark.

A. H. Clark originally called the species *Antedon ruber*. When a little later he created his new classification of the Comatulids and

referred the species to a new genus of feminine gender, he still preserved the second name *ruber* with a masculine inflection. To adapt the adjectival second name to the genus-name, I have therefore called the species *E. rubra*.

Clarkometra n. gen.

In all morphological chararacteristics this new genus proves to be a *Macrophreat* form and is to be included in the subfamily *Perometrinæ*. (Nevertheless I will call attention to the fact that the dorsal prominence on 5^{th}—8^{th} cirral is a transversely curved, even crista. This reminds one of the condition in the family *Colobometridæ*, where the crista is, however, always forked or serrate.)

Clarkometra agrees with the Central-American genus *Hypalometra* in the absence of P_1 and P_a, but differs from this one by a low, flattened Cd, by short cirri, which are composed of a rather small number of about cubical segments, and by the occurrence of 2 pairs of oral pinnules. Of the other distinguishing marks I ought, perhaps, to mention the appearance of the cirrus-sockets on Cd. (The perforation for the central canal is situated in the middle of a relatively large calcareous wart located in the central part of the cavity in which the cirrus is fixed) — A. H. Clark in a letter to me has supposed that the species described below might possibly be identical with, or nearly related to, »*Antedon impinnata*» mentioned by P. H. Carpenter from Mauritius (Chall. Exp. p. 206). It is possible, though not very likely, that the new species might be nearly related to Carpenter's species — from his very incomplete description one only learns that P_a, P_b and P_2 are absent — that it is identical with my species I consider to be out of the question, partly because of the statements about the number of cirri and cirrals, partly on account of the geographical distribution. Besides, the statements about the pinnulation rather point to a young animal than to a full-grown individual. For in connection with the notice of absence of P_2, P_a and P_b nothing is said about P_1, and one must therefore suppose that this pinnula is present.

This new, very interesting genus I have called after A. H. Clark, who has done such very meritorious work on the systemisation of the Comatulids.

Cl. elegans n. sp.

Fig. 141—149, Photo 8.

From St. 43 (15 sp.), 53 (2) = 17 specimens.

Sp. 1 (St. 43) Cd low, arched, br = 1,8 mm., free dorsal surface 1 mm., somewhat granulated. H of Cd 1 mm. (from the R—s to the dorsal pole).

C. XXX 15—18; 3,5—5 mm. in two close, alternating whorls. 1st segment shorter than long, 2d and 3d cubical, 4th L = 1 1/4 × br, then slowly decreasing. 5th—7th (or 8th) segment with a low, transverse, curved crista which from the 8th cirral concentrates to a small, simple dorsal tubercle. Opposing spine pointed, rather large (h = 1/2 of the br of the segment). Terminal claw curved, rather stout, length about the same as the preceding segment. The whole cirrus rather stout.

R—s almost concealed at the middle by Cd, a little tongue-like in the corners. I Br-s 1 baso-laterally contiguous or free, h = ± 1/4 br, with a small medio-dorsal tubercle. Axillary h = 3/4 br, almost hexagonal with a low, synarthrial, longitudial crista (rather slightly bordered) in the proximal 2/3. Arms X, 30—35 mm., smooth. Br-s 1 united inwardly to 2/3. Br 2 on the outside twice as broad. Br 1 and 2 with a slight synarthrial prominence similar to that of the I Br series. Ex of syzygies: 3 + 4, 9 + 10.. distally with an interval of 3 oblique articulations. The proximal segments rather long.

P_1 and P_a absent. P_2 12; 6,5 mm. (1st segment short, 2d a little longer than broad, 3d L = 2 br, 4th and 5th segment L = 3—4 × br, slender, at the ends somewhat widened. From the 3d segment the distal ends are indistinctly collar-shaped and have spiny borders), P_b 6 mm. P_3 11; 5 mm. P_4 10; 3,2 mm. with a genital gland and considerably shorter segments. Distal p-s. 16; 5,5 mm. (1st, 2d and the last segments short, the other ones L = 2 br).

Disk without calcareous granules, incised, longest diameter 4, shortest 2,5 mm. Anal cone long, ± 2 mm.

Cirri white, the arms red-violet.

Sp. 2 (St. 43) The size of the disk as before. Anal cone 1,5 mm. Colour a little lighter: red-grey with a light, dorsal, longitudinal band. For further details compare the table.

Sp. 3 (St. 43) R—s narrow bands. 1 Br-s 1 laterally free. The synarthrial tubercle indistinct. P_1 9; 3 mm.

Sp. 4 (St. 43) R—s well visible, h = 1/6 br. No synarthrial tubercle. Broken arms.

Sp. 5 (St. 43) R—s as in Sp. 4. P_1 7; 2,7 mm.

Sp. 6 (St. 43) P_1 9; 4,2 mm.

Sp. 7 (St. 43) P_1 8; 3,3 mm. Disk : longest diameter 3,5, shortest one 2 mm.

Sp. 16 (St. 53) Opposing spine h = 2/3 of the br of the segment. P_1 8; 3 mm. Disk 3 mm., not so distinctly incised. Anal cone 2 mm.

Sp. 17 (St. 53) Disk 2,5 mm.

Number of specimens & stations	Cirri			Arms		P_2		P_3		P_4		Dist. p.	
	N	S	L	N	L	S	L	S	L	S	L	S	L
Sp. 1 (St. 43.)	XXX	15—18	3,5—5	X	30—35	12	6,5	11	5	10	3,2	16	5,5
Sp. 2 (St. 43.)	XXVIII	16—19	3,5—5,5	X	25	12	5,5	10	4,7	10	3	15-17	5
Sp. 3 (St. 43.)	—	14—15	4,5	X	20	9	4	8	3,5	7	2,3	12	4
Sp. 4 (St. 43.)	XV	13	3—3,5	X	—	—	—	—	—	—	—	—	—
Sp. 5 (St. 43.)	XVII	13	3—3,5	X	12	8—9	2,7	7—8	2,5	8	1,5	10	2,5
Sp. 6 (St. 43.)	XXVIII	13—16	3,5—6	X	27	9	4,2	7—8	3,2	8	2,5	16	5
Sp. 7 (St. 43.)	XXIII	14—16	2,5—3,5	X	—	8	3,3	8	3	—	—	—	—
Sp. 16 (St. 53.)	XXV	15	4—5	X	27	8	3,5	8	3	8	2,7	15	4
Sp. 17 (St. 53.)	XIV	12—15	3—4,5	X	15—20	9	3	9	2,5	—	—	± 15	4

Bathymetrinæ A. H. Clark.

Thaumatometra A. H. Clark.

Th. comaster A. H. Clark.

Fig. 153—156.

Syn: *Thaumatometra comaster* 1908 A. H. Clark Proc. U. S. Nat. Mus. Vol. 34, p. 232; 1912 Crin. Ind. Oc. p. 246; 1915 Wash. Journ. Acad. Sci. Vol. 5 p. 215; 1918 Siboga Exp. Vol. 42 B, p. 256.

From St. 37 (and 4) = 2 specimens.

Sp. 1 (St. 37) Cd very low and flattened, conical, br = 2 mm., h about 0,6 mm. The free, dorsal surface 1,1 mm. C. + XXXV 12—15; 7—8 mm. in a double whorl. (1st segment short, 2d cubical, 3d L =

2 br, 4th—6th L = 3 × br, rather much hour-glass-shaped, 7th segment L = 2 1/2 br, antepenultimate one L very slightly greater than br. Terminal claw curved, about as long as the preceding segment). The distal cirrals smoother, in side view thickened.

R—s concealed. I Br-s 1 laterally free, in the middle incised by the backward projection from the axillary. Their lateral h = 1/4—1/3 of the br of the segments. Axillary h = br, with a tongue-like prominence both proximally and distally; the proximal projection is longer than the distal one. The side-angles of the axillary overlapping the I Br-s 1. Arms X, 45—50 mm. Br-s 1 inwardly contiguous basally, on the outside three times as wide. Br 2 with a stout synarthrial tongue. The first syzygial pair (3 + 4) a little broader inside than outside. The following segments irregularly squarish. The distal Br-s knotty and swollen, somewhat longer than broad. Ex. of syzygies: 3 + 4, 9 + 10, 14 + 15 etc. with an interval of 3 oblique articulations.

P_1 15; 7 mm (1st and 2d segments short, 3d L = 2—2 1/2 br, 4th and the following ones L = 3—4 br), P_2 8; 4 mm. (with a genital gland from the 3d or 4th to the 7th segment), P_3 9; 4,5 mm. (a gonad from the 3d to the 7th segment). The distal segments a little spiny distally. Distal p-s. ± 16; 6—7 mm.

Disk 3,8 mm., smooth, without stouter granules. Anal cone 3,2 mm.

Sp. 2 (St. 4) A very young specimen, probably belonging to this species.

C. + XXVI 7—10; 2—3 mm. in 2 whorls. Cd low, flattened, almost hidden by cirri. (2d cirral L = 1 3/4 br, the following segments L = 4 × br, distally somewhat expanded. Antepenultimate segment L = 1 3/4 br. Penultimate segment L = br, with an indistinct opposing spine).

I Br 1 h = 1/3 br. Axillary h = 3/4 br, the backward directed corner with a large synarthrial tongue, about twice as long as the distal angle. Arms X, 10 mm. +. Br-s 1 almost free inside. Br 2 with a synarthrial tongue. — P_1 ± 10; 1,8 mm. (L of the segments 2 1/2 br). Between P_1 and the distal pinnules a gap. Disk 1,3 mm. Anal cone 1 mm., narrowly sausage-shaped.

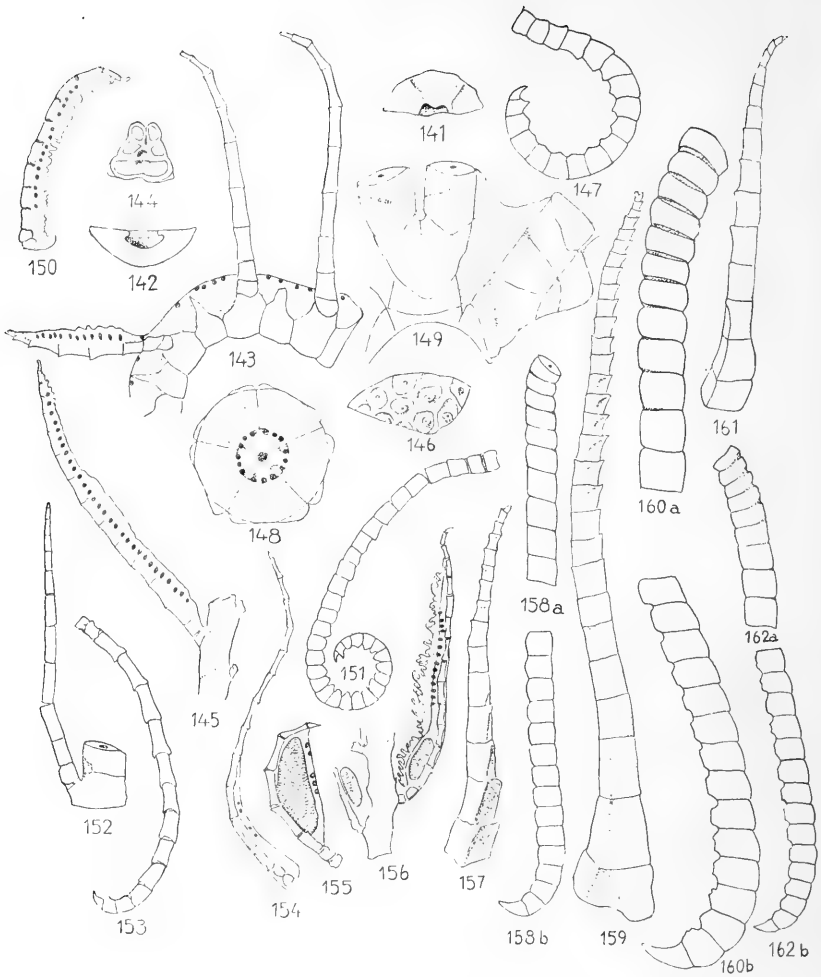

Fig. 141—149 *Clarkometra elegans* (St. 43) 141) Half Cd viewed from the ventral side $^{14}/_{1}$, 142) Half Cd viewed laterally, showing the extention of the central cavity $^{14}/_{1}$, 143) Br 4—11 with P_2—P_4 $^{14}/_{1}$, 144) The distal face of the R $^{14}/_{1}$, 145) Some Br segments and a distal pinnule $^{14}/_{1}$, 146) A part of Cd viewed from the dorsal side (observe the calcareous warts at the bottom of the cirrus-sockets), × 17 $^{1}/_{2}$, 147) Cirrus $^{14}/_{1}$, 148) Proximal radial faces with the rosette in situ, × 17 $^{1}/_{2}$, 149) The arm-bases out to Br 3 $^{14}/_{1}$; 150—152 *Erythrometra rubra* (St. 11) 150) Distal pinnule $^{14}/_{1}$,

It seems to me as if *Th. cypris* were rather indistinctly separated from the above-described species.

The dorsal prominences of the cirrals are not developed in the above specimens. Is this condition, perhaps, common to all small species of the genus *Thaumatometra*? If P_2 may have a genital gland in *Antedoninæ*, and the dorsal prominences of the cirrals may be absent in *Bathymetrinæ* the limit between the two sub-families becomes rather vague.

Pentacrinidæ (d'Orbigny).

Metacrinus P. H. Carpenter (Wyv. Thoms. M. S.).

M. nobilis var tenuis n. var.

Fig. 161, 162.

From St 7 (2), 9 (5), 56 (1), 58 (1) = 9 specimens. Also a stemless crown without indication of the locality.

Sp. 1 (St. 9) Full-grown internodes with 10—13 internodal joints, 13—18,5 mm. (8, 9 and 10 internodals each 1 case, 11 : 5 cases, 12 : 5 cases, 13 : 4 cases). Interarticular pores to the 12th internode. The 3 most proximal nodals without cirri. Full number of internodal joints in the 6th internode. The stem with 22 internodes; total length 275 mm. Diameter of the stem 3,5—4,5 mm. The segments are pentagonal, smooth; the 10 most distal internodes, however, with the joints in the radial line a little concave and provided with small tubercles. Here and there on the internodals tubercles also IR.

Cirri reaching over 2—2 1/2 internodes. 50 segments (IXth nodal) 44 mm., 44 (XIII) 36 mm., 44 (XVI) 36 mm., 40 (XVII) 31 mm., 40 (XVIII) 30 mm. 7th segment L = br; 15 last segments with dorsal spines. L of the terminal claw = 1 1/2 times the preceding segment.

151) Cirrus 9/1, 152) Br 2 and 3 with P_1 14/1; 153—156 *Thaumatometra comaster* (St. 37), 153) Cirrus 9/1, 154) P_1 14/1, 155) P_2 with a genital gland 14/1, 156) An arm-stump with distal pinnules (a small genital gland from the 3d—the 5th segments) 9/1; 157, 158 *Metacrinus interruptus* (Sp. 10) 157) P_1 (I Br 3) viewed somewhat more laterally than in the two following species, × 4 1/2, 158) Cirrus a) Proximal part b) Distal part, × 4 1/2; 159, 160 *Metacrinus rotundus* (Sp. 2) 159) P_1, × 4 1/2, 160) Cirrus a) Proximal b) Distal part, × 4 1/2; 161, 162 *Metacrinus nobilis tenuis* (Sp. 1) 161) P_1, × 4 1/2, 162) Cirrus a) Proximal part (observe: by the position of the basal cirrals the cirrus is bent downwards, not, as in the two preceding species, upwards) b) Distal part, × 4 1/2.

No opposing spine. The cirrus-socket entering somewhat into the supra- and infra-nodal joint.

B—s contiguous, shield-shaped, h: 1,3, br: 3,5 mm. R—s soldered together laterally, h = 1,3 mm., br = 4 mm. I Br-s 4 (1 + 2); 7 mm. II Br-s 7 (2 + 3) or 7 (3 + 4) each in 4 cases, 9 mm. The two remaining divisions broken. III Br-s 11 (3 + 4) 3 cases, 13 (3 + 4) 2 cases, 15 (3 + 4) 2 cases; 11—15 mm., the other ones broken. IV Br-s 13 (3 + 4), 15 (3 + 4) each in one case. The Br-s smooth. The perfect specimen probably with LV arms; the total arm-length is 95 mm. L of an unramified arm from III Brax 65 mm.

P_1 (to the right on I Br 2 and to the left on I Br 3 in 2 cases, the reverse condition in 3 cases) 14—15; 13 mm. (1st and 2d segments stout, square, the L in total 3 mm., the rest of the segments strongly compressed), P_2 17; 18 mm., P_3 17—18; 18 mm., P_4 14; 12 mm. — Disk with small calcareous granules. — Colour, in spirits, white with a green-bluish tinge.

Sp. 2 (St. 9) 18 Internodes; 240 mm. Internodal joints 13 (1 case), 14 (12 cases); 15,5—18 mm. Interarticular pores to the 10th internode. Full number of internodal joints and number of proximal nodals without cirri as in Sp. 1. Diameter of the stem 4,5—4,8 mm.

Cirri extending over 2 internodes. Length on the Xth nodal 40 mm., 43 (XIIth nodal) 38 mm., 48 (XIII) 35 mm. The fixing point for the cirrus just touching the supranodal. The infranodal joint sloping towards the fixing point. I Br-s 4 (1 + 2) 9 mm. only remaining in one case. II Br-s 7 (3 + 4) 11 mm. (1 case).

P_1 to the right on I Br 2, to the left on I Br 3 in the only occurring case.

Sp. 3 (St. 9) 23 internodes, 295 mm. Internodal joints 12 (1 case), 13 (11 cases), 14 (5 cases); 12,8—16,2 mm. Interarticular pores to the 10th or 11th internode. The joints are pentagonally rounded, smooth. Diameter of the stem 4,8—5,5 mm.

Cirri 55 (Xth node) 59 mm., 53 (XIII) 58 mm. 51 (XX) 55 mm.; extending over $2^3/_4$—$3^1/_2$ internodes. From the 8th segment the cirrals are as long as broad The 20 last joints with a slight dorsal carination. The crown thrown off from the B—s.

Sp. 4 (St. 9) 17 internodes, 225 mm. Internodal joints 13 (6 cases), 14 (6 cases), 15 (1 case); 15—18 mm. Interarticular pores to

the 9th internode. Diameter of the stem 4,7—5,0 mm. The segments are smooth, distally almost perfectly round or 10-agonal by a slightly developed radial tubercle. The interradial tubercles usually smaller than the radial ones, all of them very inconspicuous.

Cirri 47 (IXth node) 48 mm., 46 (XI) 46 mm., 46 (XIV) 46 mm. Reaching over 2 1/2 internodes. — Crown thrown off.

Sp. 5 (St. 9) 13 internodes; 125 mm. Internodal joints 13 in all the full-grown internodes; 14,7—15 mm. Interarticular pores to the 10th internode. Diameter of the stem 4,0—4,4 mm. 3 proximal nodal joints without cirri. Full number of nodal joints in the 6th internode. The segments as before smooth or slightly swollen in the middle. Cirri 44 (IX), 43 (XII) 40 (XIII), 35—40 mm. Extending over 2 1/4 internodes. The crown thrown off.

Loose crowns (St. 9)

1) R—s h: 1,3, br: 4,5 mm. I Br-s 4 (1 + 2); 13 mm., occurring in 5 cases. II Br-s 5 (3 + 4) 2 cases, 6 (1 case), 7 (7 cases) with syzygies between the 2d and 3d segment in 4 cases, between the 3d and 4th in 3 cases; 7—10 mm. III Br-s 9 (3 + 4) 4 cases, 10; 1 case, 11 (3 + 4) 8 cases, 13 (3 + 4) 5 cases; 9—11 mm. The higher figures usually on the inner side. IV Br-s 11 (3 + 4) 4 cases, 13 (3 + 4) 3 cases, 15 (3 + 4) 5 cases, 17 (3 + 4) 2 cases, 19 (3 + 4) 5 cases, 21 (3 + 4) 3 cases; 10—20 mm. Arms LX, 140 mm., smooth. Length of an undivided arm from IV Brax 90 mm. 40—50 last mm-s. with rudimentary p-s. Syzygies: 3 + 4, 17 + 18, 37 + 38, 56 + 57 etc.

P_1 to the right on I Br 2 in 5 cases. Distal p-s ± 15; 10 mm.

Disk ± 14 mm., coarsely granulated. Anal tube 12 mm. Colour lightly red-grey.

2) A very broken specimen. I Br-s 4 (1 + 2) 1 case; 8,5 mm. II Br-s 8 (2 + 3, 5 + 6) or 8 (1 + 2, 4 + 5) 2 cases; 12 mm. — III Br-s 15 (3+4) 1 case; 17 mm. P_1 to the right on I Br 2 in the only occurring case.

Example of pinnulation:

$$\text{I } 1+2\,\bar{3}\,4\begin{cases}\text{II } 1+2\,\underline{3}\,4+5\,\underline{6}\,7\,8\begin{cases}\text{III } 1\,2+\\ \text{III } \underline{1}\,\bar{2}\,3+\underline{4}\ldots\ldots\underline{14}\ 15\end{cases}\\ \text{II } \underline{1}\,2\ .\ 3\,4\,5\cdot\cdot\ 6\,7\,8\begin{cases}\text{III } 1\,\underline{2}\,3+\\ \text{III } 1\,2\,3+\end{cases}\end{cases}$$

Sp. 6 (St. 7) *A stemless crown.* — R—s 1 × 3 mm. I Br-s 4 (1 + 2); 7 mm.; present i 4 cases. II Br-s 7 (2 + 3) 4 cases, 8: 3 cases, of which the syzygies between 1 + 2, 4 + 5 in 1 case, between 2 + 3, 5 + 6 in 2 cases; 10 mm. The other ones broken. III Br-s 9 (3 + 4) 1 case, 11 (3 + 4) 7 cases, 13 (3 + 4) 6 cases; 8—11 mm. IV Br-s 11 (3 + 4) 3 cases, 13 (3 + 4) 10 cases, 15 (3 + 4) 1 case, 17 (3 + 4) 1 case, 18 (3 + 4, 8 + 9, or 3 + 4, 13 + 14) 2 cases, 20 (3 + 4, 12 + 13) 1 case, 22 (3 + 4, 15 + 16) 2 cases, 23 (3 + 4, 6 + 7, 16 + 17) 3 cases, 25 (3 + 4, 6 + 7, 17 + 18 or 3 + 4, 10 + 11, 20 + 21 the former condition in 2, the latter in 1 case), 27 (3 + 4, 11 + 12, 23 + 24) 1 case; 10—22 mm. The higher figures on the inner sides, e. g. 13—22—25—13; 13—23—22—11; 15—27—25—11 Arms LVI (probably about LXXV in the complete specimen), total length 115 mm. +. The length of a free arm after a IV Brax 75 mm. Rudimentary pinnules on the last 30 mm. The distal Br-s somewhat collar-shaped.

P_1 12; 10 mm. (to the left on I Br 2 in 3 cases of 4), P_2 14; P_3 14; 15 mm. P_7 and the following ones 12—15; 10 mm. At the transition to the rudimentary pinnules the number of segments are 14 .... 12, 9, 8, .. 7, 7, 8, .. 6, 6, 5, 4, 3, 3, 3, 2, 2, ...

Sp. 7 (St. 7) *A stemless chalice.* I Br-s 4 (1 + 2); 7 mm. II Br-s 6 (3 + 4) 1 case, 7 (3 + 4) 5 cases, 7 (2 + 3) 1 case; 8—9 mm. III Br-s 9 (3 + 4) 1 case, 11 (3 + 4) 3 cases, 13 (3 + 4) 1 case; 10—12,5 mm. IV Br-s 11 (3 + 4) 2 cases, 13 (3 + 4) 2 cases, 17 (3 + 4) 1 case; 10—14 mm. A perfect specimen, probably, with about LXX arms; total length 105 mm. L of the unramified arm after IV Brax 65 mm. Part of the arm with rudimentary p-s 35 mm. Syzygies after a IV Brax: 3 + 4, 29 + 30, 41 + 42 or 3 + 4, 23 + 24, 42 + 43 ....

P_1 8—10 (to the right on I Br 2 in 2 cases, to the left in 3 cases); 7 mm. Distal p-s ± 12; 9,5 mm.

A loose crown without indication of the locality: I Br-s 4 (1 + 2); 7 mm. II Br-s 5 (2 + 3) 1 case, 7 in 9 cases, of which in 1 case the syzygies between 1 + 2, in 3 cases between 2 + 3, and in 5 cases between 3 + 4; 8—10 mm. III Br-s 9 (3 + 4) 2 cases, 11: 9 cases (the syzygy in 1 case 2 + 3, in 8 cases 3 + 4), 13 (3 + 4) 8 cases; 10,5—13 mm. IV Br-s 11 (3 + 4) 1 case, 13 in 12 cases (2 cases: 4 + 5; 10 cases: 3 + 4), 15 (3 + 4) 7 cases, 17 (3 + 4) 1 case, 19 (3 + 4) 4 cases, 20 (3 + 4, 14 + 15 or 3 + 4, 16 + 17: 2 cases, or 3 + 4, 17 + 18 or

3 + 4, 18 + 19) 5 cases, 21 (3 + 4) 1 case, 22 (3 + 4, 13 + 14 or 3 + 4, 15 + 16) 2 cases, 24 (3 + 4, 15 + 16) 1 case; 10—17,5 mm. V Br-s 13 (3 + 4) 1 case. — Arms LXXIV. Total length 135 mm. Free arm-length after IV Brax 75 mm. The arm-part with rudimentary p-s 35 mm.

P_1 (to the right on 1 Br 2 in 5 cases) 10; 13 mm., P_3 14; 17 mm. Distal p. 13; 11—12 mm. Disk 10 mm. Anal cone 7 mm.

Sp. 8 (St. 56) 15 internodes, 160 mm. Internodal joints 11: 3 cases, 12: 3 cases, 13: 6 cases; 9—13 mm. Interarticular pores to the 7th internode. 3 proximal nodals without cirri. Full number of internodals at the 4th internode. Diameter of the stem 2,5—2,8 mm.

Cirri 38 (VI) 28 mm., 37 (VII) 29 mm., 36 (IX) 30 mm., 34 (XI) 26 mm., 36 (XIII) 21 mm., 35 (XV). Cirri extending over 2 internodes.

B—s 1 × 2 mm. R—s 1 × 3 mm. I Br—s 4 (1 + 2); 6 mm., in 4 cases. II Br-s 7 (2 + 3); 6 mm. in 1 case. III Br-s 11 (3 + 4) 2 cases; 9 mm. IV Br-s 11 (3 + 4) 1 case, 15 (3 + 4) 1 case, 21 (3 + 4) 2 cases. The other arm-divisions broken. Total L of the arms 80 mm. Free part from a III Brax 55 mm. Part of the arm with rudimentary p-s about 10 mm. Ex. of syzygies: 4 + 5, 24 + 25, 34 + 35 . .

P_1 (to the right in 2 cases of 4) 12—14; 10—11 mm. P_2 15; 11 mm. Distal p-s 11; 6 mm.

Sp. 9 (St. 58) 14 internodes, 100 mm. Number of internodals 6—11; 5,5—10 mm. Interarticular pores to the 6th internode. Diameter of the stem 0,8 – 1,6 mm. Number of internodal joints, counted proximo-distally (from the chalice), are: 0, 0, 0, 1, 3, 7, 9 (6 mm.) 10 (8,2 mm.) 11 (9), 10 (8), 11 (9), 10 (8,5), 9 (7), 7 (5,5), 6 (5), 11 (10), 10 (9). Stem smooth.

Cirri 26 (VII) 18 mm., 25 (X) 16 mm., 23 (XIII) 14 mm., 21 (XV). From the 4th segment the L of the segments are = 1 1/2 br, last 7 segments L = br or shorter. A dorsal spine scarcely developed. Cirri extending over 2 internodes.

I Br-s 4 (1 + 2) in 4 cases, 5 (1 + 2 3 + 4) 1 case; 5 mm. II Br-s 7 (2 + 3) 5 cases, 8 (1 + 2, 4 + 5 or 2 + 3, 6 + 7, the former condition in 1 case, the latter one in 3) 4 cases; 6 mm. III Br-s 11 (3 + 4: 8 cases, 2 + 3: 1 case) 9 cases, 13 (3 + 4) 7 cases, 15 (3 + 4) 2 cases; 8—10 mm. IV Br-s 11 (3 + 4) 1 case, 13 (3 + 4) 12 cases, 14 (3 + 4, 10 + 11) 1 case, 15 (3 + 4) 3 cases, 17 (3 + 4) 7 cases, 19 (3 + 4) 1 case; 6—7 mm. Arms LXII +, total length 30 mm. Free L after a III Brax

10—12 mm. The part of the arm that supports the rudimentary pinnules 3 mm. The arms derived from IV Brax of very different lengths, cf. the table below:

III . . 3 + 4 . . . 13	III . . 3 + 4 . . . 11	IV . . 3 + 4 . . . 17	Br $\bar{1}$ $\underline{2}$ 3 + $\bar{4}$ . . . 9	3 mm.
			Br $\underline{1}$ $\bar{2}$ 3 4	0,8 mm.
		IV . . 3 + 4 . . . 13	Br $\bar{1}$ $\underline{2}$ 3 + $\bar{4}$ . . . 7	1,2 mm.
			Br $\underline{1}$ $\bar{2}$ 3 + $\underline{4}$ 13	5,0 mm.

P_1 (to the right on I Br 2 in 5 cases) 9; 5 mm., P_2 10; P_3 10; $P_{IV\ Br}$, 7; 2 mm.

Disk coarsely granulated, with a long, plated anal tube. No orals remaining.

As is evident from the descriptions given above the number of cirrals and cirri is to a certain degree proportional to the thickness of the stem, that is to the age of the specimen. The different stages of age that the present specimens represent permit a rough estimate of the L of the stem in a full-grown specimen. *Specimen 3* has a L of the stem of 295 mm. and an increase of 4,8—5,5 mm. of the stem-diameter. *Sp. 2* has a 240 mm. long stem and a diameter of 4,5—4,8 mm. *Sp. 1* has a stem length of 275 mm. and a stem-diameter of 3,5—4,5 mm. In *Sp. 8* the stem on a L of 160 mm. has increased from 2,5—2,8 mm. and in *Sp. 9* from 0,8—1,6 mm. on a L of 100 mm. To judge from these specimens the increase of the diameter of the stem is thus rapid to 1,5 mm. rather slow at about 2,5 mm., again somewhat more rapid between 3,5 and 4,5 mm. retarded between 4,5 and 4,8 mm., and a little faster between 5,0 and 5,5 mm. Nevertheless there is a general decrease in the rapidity of the thickness-growth of the stem, i. e. younger specimens grow faster, older ones usually more slowly. The total length of the stem, judging from the above figures, might be between *1,5 and 2,0 metres.*

To the so-called *nobilis*-group Döderlein has assigned 4 species: *M. nobilis*, *varians*, *suluensis* and *superbus*. I can here leave the two last-mentioned ones out of the question, as they are well separated from the 2 preceding species and from the above-described variety. *Metacri-*

nus nobilis with varieties and *M. varians* Döderlein has distinguished according to the below combined scheme:

I Large species. Diameter of the stem 5—7,5 mm. IV Brachials ordinary. Internodals smooth, without distinct furrows between the joints. *M. nobilis*

1) 8 internodal joints. Cirri extending over 4 internodes. Diameter of the stem 5—6 mm. 5 »Radials» *M. nob. var. sumatranus*

2) 9—10 internodal joints. Cirri extending over 3—4 internodes. Diameter of the stem 6—7,5 mm. 6(—7) »Radials» *M. nob. var. timoriensis*

3) 10—12 internodal joints. Cirri extending over 3 internodes. Diameter of the stem 6—7 mm. 5 »Radials» *M. nob. var. nobilis.*

4) 13—15 Internodal joints, otherwise as in the preceding variety. Here is to be mentioned also the sp. from Siboga Stat 251, 253, 254. *M. nob. var. murrayi.*

II Small species. Diameter of the stem 4—5 mm. Rarely IV Br-s. Internodal joints 6—8. Distinct furrows between the internodals. Cirri extending over 4—5 internodes. *M. varians.*

To which species ought the above-described specimens then to be referred? From the point of view of the diameter of the stem and the number of pinnulars they are most closely related to *M. varians*, but by the number of internodals, L of cirri and number of cirrals, by the occurrence of IV Br-s, by the number of internodes with interarticular pores they approach *M. nobilis* and especially the varieties *nobilis* and *murrayi* of this species. Why have I not referred them to these two varieties, which moreover may scarcely be considered as more than types of individual variation? The smaller diameter of the stem in my specimens is an important distinguishing mark, but merely because of this I would not establish a new variety, as the difference might be due to a difference in age. As I have pointed out above, the number of the cirrals is to a certain degree in proportion to the size of the animal. When therefore, in spite of the delicate stem, the Bockian specimens have a number of cirrals reaching or exceeding that stated for M. *nobilis*, the different diameters of the stems cannot be considered as due to differences of age. Besides, the proximal pinnules in the new variety are shorter than both in *M. nobilis* and *varians.*

Two of the previously described varieties of *M. nobilis* show in separate characteristics an approach to *M. varians: M. n. var. suma-*

tranus by the number of internodal joints, by the diameter of the stem, by the L of the cirri when compared with the L of the internodes; *M. n. var. timoriensis* by the variability of the I Br-s. It ought therefore not to be so surprising that the new variety of *M. nobilis* established here approaches *M. varians* in a couple of characteristics: a slender stem and short pinnules.

Metacrinus rotundus P. H. Carp.

Fig. 159, 160.

Syn.: *Metacrinus rotundus* 1884 P. H. Carpenter Chall. Exp. Vol.11, p. 344; 1885 Trans. Linn. Soc. Ser. 2 Vol. 2, p. 436; 1902 (04) Frank Sperry Proc. Mich. Acad. Sci., p. 195; 1908 A. H. Clark Proc. U. S. Nat. Mus. Vol. 34, p. 529; 1911 Proc. U. S. Nat. Mus. Vol. 39, p. 487; Notes from the Leyden Mus. Vol. 33, p. 192; 1912 Crin. Ind. Oc. p. 270; Proc. U. S. Nat. Mus. Vol. 43, p. 408; Smiths. Misc. Coll. Vol. 60, N:o 10, p. 33; 1913 Smiths. Misc. Coll Vol. 61, N:o 15, p. 69; 1915 Monograph p. 89.

Metacrinus Stewarti 1884 P. H. Carpenter Chall. Exp. Vol. 11, p. 344; 1885 Trans. Linn. Soc. Ser. 2. Vol. 2, p. 443; 1908 A. H. Clark Proc. U. S. Nat. Mus. Vol. 34, p. 529; 1912 Crin. Ind. Oc., p. 270.

The Vega specimen 1884 P. H. Carpenter Chall. Exp. Vol. 11, p. 344.

From St. 10 (1 sp.), 24 (1), 29 (1), 30 (1), 31 (2), 32 (1) = 7 specimens.

Sp. 1 (St. 30) 24 Internodes; total length of the stem 400 mm. 3 nodal joints before the first cirrus-bearing node. Full number of internodals in the 5th internode. Interarticular pores to the 12th internode. Internodal joints 11 : 3 cases, 12 : 9 cases, 13 : 3 cases, 14 : 3 cases, 15 : 2 cases; 14—17 mm. Stem after the 16th node decumbent in the bed-ooze. Full-grown segments rounded. The socket for the cirrus extending to the supra-, but not to the infranodal joint. Interradial swellings or tubercles on the nodals (slightly developed distally).

Cirri 44 (VIIIth node), 48 (XI), 37 (XII), 44 (XV); 49—56 mm. L of the 5 first segments = 1/3 br, about the 12th cirral L = br. A dorsal longitudinal carination, more or less divided into 2 prominences, on each ossicle appearing after the 20th cirral. Cirri extending over 2 1/2—3 1/4 internodes.

B—s contiguous, L = 2/3 br. I Br-s 7 (1 + 2, 4 + 5) in 5 cases; 16 mm. Primipostaxillaries free inside. II Br-s 7 (3 + 4) 1 case, 10 : 1

case, 11 (3 + 4) 6 cases, 13 (3 + 4) 1 case, 21 (3 + 4) 1 case; 19—32 mm. III Br-s 9 (3 + 4) 1 case, 10 : 1 case, 11 (3 + 4) 2 cases, 12 : 1 case, 13 (3 + 4) 9 cases, 15 (3 + 4) 1 case, 16 (3 + 4, 6 + 7) 1 case, 17 (3 + 4) 1 case, 18 : 1 case, 25 (3 + 4) 1 case; 17—32 mm. IV Br-s 13 (3 + 4) 1 case, 15 (3 + 4) 1 case, 16 (4 + 5, 8 + 9) 1 case, 17 (3 + 4) 1 case, 18 (3 + 4, 13 + 14 : 1 case, 4 + 5 : 1 case) 2 cases, 19 (3 + 4 : 2 cases, 4 + 5 : 1 case) 3 cases, 21 (3 + 4) 1 case, 25 (3 + 4) 1 case, 26 (3 + 4, 12 + 13) 1 case. V Br-s 19 (4 + 5) 1 case, 23 (8 + 9) 1 case. Arms LIII. Total length 180 mm. Arm-length after a III Brax 110 mm. with 107—116 Br-s. The arms proximally wall-sided thus, that the lateral borders of I Br 1 are contiguous, and the left side of I Br 2 + the first segment of the pinnule correspond to the right side of I Br 2 and 3. Syzygies after a III Brax 3 + 4, 37 + 38, 52 + 53, 70 + 71, 107 or 3 + 4, 26 + 27, 50 + 51, 74 + 75, 87 + 88, 113 + 114, 116. After a IV Brax the figures are: 3 + 4, 20 + 21, 45 + 46, 79 + 80, or 3 + 4, 8 + 9, 18 + 19, 28 + 29, 38 + 39 . . .

P_1 24—32; 30—35 mm. The 10 most proximal segments sharply quadrangular, strongly compressed laterally after the 2^{d} segment, with ambulacral furrow, (to the right on I Br 2 in 5 cases), P_2 24—30; P_7—P_{10} the shortest ones, then longer p-s again. The most distal segments on P_1—P_4 with collars with small spines. From P_5 smooth segments. The p-s from the middle parts of the arms 12—15 mm. The last 20 pairs of p-s rudimentary with 2—4 segments.

Chalice in transverse section about 20 mm. Colour (in spirits) whitish, the arms light brown. Syzygial pairs white. — Disk with coarse granules. — The specimen handed over to the museum at Gothenburg.

Sp. 2 (St. 31) 23 Internodes, 350 mm. Interarticular pores to the 11th internode. 4 nodal joints without cirri. Full number of internodals in the 6th internode. Internodal joints 11 : 10 cases, 12 : 6 cases, 13 : 2 cases (11 distally, 12 proximally); 15—18 mm. Diameter of the stem 6.0—6.2 mm.

Cirri 53 (IXth node), 55 mm., 49 (X) 53 mm., 46 (XIX) 50 mm., 49 (XXII) 50 mm. Extending over 2^1/$_2$—3 internodes. Cirrals 1,5—1,8 mm. in cross section. The last 20—30 segments with a double dorsal spine as in Sp. 1. The facet for the cirrus extending over ^{3}/$_4$ of the nodal and over ^{1}/$_4$ of the supranodal joint. Interradial tubercles on

the nodals stoutly developed often as far as the XXth node. Internodal joint with slight interradial swellings and indistinct ring-ridges, often disappearing radially.

B—s 3 × 6 mm. hardly contiguous. R—s 1,$_7$ × 8 mm. band-shaped, with a concave distal margin. I Br-s 7 with syzygies between 1 + 2, 4 + 5 in 4 cases, between 1 + 2, 4 + 5, 6 + 7 in 1 case; 17—19 mm. II Br-s 2 (1 + 2) 1 case, 6 (1 + 2, 5 + 6) 1 case 7 (1 + 2 : 1 case, 3 + 4 : 5 cases, 5 + 6 : 1 case) 7 cases, 8 (3 + 4) 1 case; 5—15 mm. III Br-s 7 (3 + 4 or 5 + 6) 2 cases, 9 (3 + 4) 3 cases, 11 (3 + 4) 6 cases, 12 : 1 case, 13 (3 + 4 : 3 cases, 1 + 2 : 1 case) 4 cases, 15 (3 + 4) 3 cases, 17 (3 + 4) 1 case; 12—24 mm. IV Br-s 9 (3 + 4) 1 case, 11 (3 + 4) 1 case, 13 (1 + 2 : 2 cases, 3 + 4 : 3 cases) 5 cases, 15 (3 + 4) 2 cases, 17 (1 + 2 or 4 + 5) 2 cases, 18 (5 + 6, 11 + 12) 1 case, 20 (3 + 4, 9 + 10) 1 case, 23 (3 + 4) 1 case, 25 (3 + 4) 1 case, 26 (3 + 4, 15 + 16) 1 case, 29 (3 + 4, 14 + 15, 19 + 20) 1 case, 32 (3 + 4, 21 + 22) 1 case; 12—34 mm. V Br-s 10 (7 + 8) 1 case, 14 (3 + 4, 10 + 11), 17 (3 + 4), 18 (3 + 4, 8 + 9), 22 (3 + 4, 15 + 16), 24 (3 + 4, 13 + 14) each in one case; 16—26 mm. Arms LIV, total L 170 mm. Free, undivided part 80—120 mm. The distal parts of the Br-s somewhat overlapping and provided with small spines.

P_1 (to the right on I Br 2 in 5 cases) 32; 35 mm. Disk finely granular. Colour: uniformly duskish grey. The arms regenerated from the III Br.

Sp. 3 (St. 31) 25 internodes, 375 mm. 3 proximal nodal joints without cirri. Full number of internodal joints in the 6th internode. Number of internodals 10 : 4 cases, 11 : 13 cases, 12 : 3 cases; 14—17 mm. Interarticular pores to the 9th internode. Diameter of the stem 6,$_3$—6,$_5$ mm. The intercirral tubercle not very prominent after the 7th node. The ring-ridge slightly developed.

Cirri 46 (IX) 54 mm., 53 (XII) 54 mm., 50 (XXI) 52 mm. Extending over 3—3$^1/_2$ internodes.

B—s 3 × 5 mm. R—s: 2,$_5$ × 6,$_5$ mm. I Br-s 7 (1 + 2, 4 + 5) 4 cases, 8 (1 + 2, 4 + 5) 1 case; 18—21 mm. II Br-s 5 (2 + 3) 1 case, 7 (3 + 4) 1 case, 8 : 1 case, 9 (3 + 4 or 4 + 5 or 5 + 6 or 6 + 7) 4 cases, 11 (4 + 5) 1 case, 12 (1 + 2, 11 + 12 or 1 + 2, 4 + 5) 2 cases; 10—20 mm. III Br-s 13 (3 + 4) 3 cases, 15 (3 + 4; 1 case 2 + 3) 9 cases, 16 : 1 case, 17 (3 + 4) 5 cases, 18 (3 + 4, 13 + 14) 1 case, 19

(3 + 4) 1 case; 19—28 mm. IV Br-s 13 (5 + 6) 1 case, 17 (3 + 4 or 3 + 4, 12 + 13) 2 cases, 18 (3 + 4, 14 + 15) 1 case, 19 (3 + 4 or 3 + 4, 9 + 10, 15 + 16) 2 cases, 20 (3 + 4, 9 + 10 or 3 + 4, 15 + 16 or 3 + 4, 16 + 17 or 3 + 4, 17 + 18) 4 cases, 22 (3 + 4, 19 + 20 or 3 + 4, 20 + 21) 2 cases, 24 (3 + 4, 17 + 18) 1 case, 25 (3 + 4, 12 + 13, 20 + 21) 1 case, 26 (3 + 4, 22 + 23) 1 case, 28 or 29 (1 2 (3) + 4 5 6 + 7 8 . .) 1 case (the 3d segment rudimentary); 17—32 mm. Arms LVI, total L 175 mm., a regenerated part only 140 mm. The undivided part of the arm 75—110 mm. Example of the decrease in the number of pinnulars: 13, 10, 10, 8, 7, 5, 4, 4, 3, 3, . . (7—1,5 mm.).

P_1 (to the right on I Br 2 in 4 cases of 5) 22—24; P_5 (on II Br 5) 15; 15 mm. P_{15} 17; 12 mm.

Sp. 4 (St. 32) 28 internodes, 460 mm. 3 nodal joints without cirri. Full number of internodals at the 6th internode. Internodal joints 11 : 14 cases, 12 : 8 cases, 14 : 1 case; 14—17 mm. (distally the shortest indernodes). Interarticular pores to the 9th internode. Diameter of the stem 6,7—6,0 mm.! (Thus a more slender stem proximally. Slight, incomplete ridges on the internodals.)

Cirri 45 (VII), 44 (XII), 43 (XV), 45 (XXV); 46—49 mm. Extending over 2½—3 internodes.

B-s 2 × 6 mm, R-s 2 × 7 mm. I Br-s 7 (1 + 2, 4 + 5; 4 cases; 1 + 2, 3 + 4 : 1 case) 5 cases; 18—19 mm. II Br-s 6 : 1 case, 7 (3 + 4; 1 case 4 + 5) 9 cases; 13—15 mm. III Br-s 11 (5 + 6) 1 case, 13 (3 + 4; 1 case 5 + 6) 9 cases, 15 (3 + 4) 5 cases, 17 (3 + 4 : 2 cases, 1 + 2, 4 + 5, 14 + 15 : 1 case) 3 cases, 19 (3 + 4) 1 case, 20 (3 + 4, 17 + 18) 1 case; 19—26 mm. IV Br-s 18 (3 + 4, 7 + 8) 1 case, 19 (3 + 4, 7 + 8, 15 + 16 or 5 + 6) 2 cases, 20 (3 + 4 or 3 + 4, 16 + 17) 2 cases, 22 (3 + 4, 9 + 10 or 5 + 6, 18 + 19) 2 cases, 24 (6 + 7) 1 case, 30 (3 + 4, 18 + 19) 1 case; 19—25 mm. Arms XLIX, total L 185 mm. Free arm-length 90—120 mm. A lot of new regenerated arms. Ex of syzygies: 3 + 4. 23 + 24 . . .

P_1 (to the right on I Br 2 in 3 cases of 5) 18—19; 24 mm, P_2 17; P_4 18; P_{15} 18; 15 mm.

One radial branch shows an irregular pinnulation;

$$R\ 1\ 1+2\ 3\ 4+5\ 6\ 7 \begin{cases} II\ 1\ \underline{2}\ 3+\underline{4}\ \underline{5}\ \underline{6}\ 7 \begin{cases} III\ 13\{\ldots \\ III\ 15\{\ldots \end{cases} \\ II\ 1\ 2\ 3+4\ 5\ 6\ 7 \begin{cases} III\ 19\{\ldots \\ III\ 15\{\ldots \end{cases} \end{cases}$$

Sp. 5 (St. 24) 17 internodes, 220 mm. 4 nodal joints without cirri. Full number of internodals in the 5th internode. Internodal joints 9 : 1 case 10 : 3 cases, 11 : 9 cases; 12—15 mm. Interarticular pores to the 10th internode. Diameter of the stem: 5,1—5,4 mm. Every second internodal joint somewhat lower as far as the 10th internode.

Cirri 44 (IX), 47 (X), 45 (XI), 44 (XVII), 32 (XVIII); 37—46 mm. Extending over 2½—3 internodes.

B—s heart-shaped, not contiguous laterally. I Br-s 7 (1 + 2, 4 + 5 : 3 cases, 1 + 2, 3 + 4 : 1 case) 4 cases, 8 (1 + 2, 4 + 5) 1 case; 15—17 mm. II Br-s 9 (3 + 4) 1 case, 11 (3 + 4) 8 cases, 13 (3 + 4) 1 case; 15—21 mm. III Br-s 11 (3 + 4) 1 case, 13 (3 + 4) 3 cases, 15 (3 + 4) 5 cases, 16 (3 + 4, 14 + 15) 1 case, 17 (3 + 4) 1 case, 18 (3 + 4, 13 + 14 or 3 + 4, 14 + 15 or 3 + 4, 15 + 16) 3 cases, 20 (3 + 4, 16 + 17 : 2 cases 3 + 4, 13 + 14 : 2 cases) 4 cases, 21 (3 + 4, 13 + 14) 1 case, 22 (3 + 4, 18 + 19) 1 case. Arms XL, total L 155—175 mm. Br-s about 115. Ex. of syzygies: 3 + 4, 13 + 14, 22 + 23 etc. with an interval of 6—10 oblique articulations. The arm-segments distally somewhat spiny and overlapping.

P_1 (to the right on I Br 2 in 4 cases of 5) 18; 22 mm. P_2 22 +; 27 mm., P_3 23; 23 mm., P_4 20; 18 mm., P_5 23; 19 mm. (smoother), P_6 20; 17 mm. P_1 (to the left on I Br 2: 1 case) 24; 25 mm. P_{10} 21; 16 mm. Disk coarsely granular. Light spots at the syzygial pairs.

Sp. 6 (St. 29) 23 internodes, 370 mm. Interarticular pores to the 9th internode. 4 nodes without cirri. Full number of internodals in the 5th or 6th internode. Number of internodal joints 10 : 2 cases, 11 : 4 cases, 12 : 7 cases, 13 : 1 case, 16 : 1 case, 17 : 2 cases, 19 : 1 case; length of the internodes 14—24 mm. Diameter of the stem 6,5—6,5 mm. The ring-ridge of the internodals divided in a radial middle tubercle and a low ridge on each side of the tubercle. A similar condition also often in the preceding specimens.

Cirri 52 (IX) 53 mm., 49 (XI) 50 mm., 47 (XV) 50 mm. Extending over $2^1/_2$—3 internodes.

B—s 3 × 6 mm. R—s 1,3 × 6 mm. I Br-s 7 (1 + 2, 4 + 5) 2 cases, 8 (1 + 2, 4 + 5, 7 + 8 or 1 + 2, 3 + 4, 6 + 7) 2 cases, 10 (1 + 2, 3 + 4, 6 + 7, 9 + 10) 1 case; 21—25 mm. II Br-s 7 (3 + 4) 4 cases, 8 (3 + 4 or 2 + 3, 7 + 8) 2 cases, 9 (3 + 4) 3 cases, 10 (1 + 2, 6 + 7) 1 case; 12—17 mm. III Br-s 11 (3 + 4) 1 case, 12 (3 + 4, 7 + 8) 1 case, 13 (3 + 4) 8 cases, 14 (3 + 4, 8 + 9) 1 case, 15 (3 + 4) 3 cases, 16 (3 + 4, 12 + 13 or 3 + 4, 13 + 14) 2 cases, 17 (3 + 4) 4 cases; 17—26 mm. IV Br-s 15 (3 + 4) 2 cases, 16 (3 + 4, 14 + 15) 1 case, 17 (3 + 4 : 4 cases, 5 + 6 : 1 case, 10 + 11 : 1 case) 6 cases, 19 (3 + 4) 1 case, 20 (3 + 4, 6 + 7) 1 case, 21 (3 + 4, 15 + 16, 20 + 21) 1 case, 23 (3 + 4) 1 case, 24 (3 + 4, 8 + 9[1] or 3 + 4, 16 + 17) 2 cases, 26 (3 + 4, 6 + 7) 1 case; 20—29 mm. Arms LVI, total L 205 mm., Free undivided part of the arm 95—140 mm. 35—40 mm. of the distal parts of the arms with rudimentary p-s. The number of pinnulars in the transition region is 14, 13, 15, 12, 9, 10, 10, 7, 4, 4, 3, 3, . . .

P_1 (to the right on I Br 2 in 5 cases) 23; P_2 24. Disk stoutly granulated. The arms light-brown, darker in the proximal parts (the transition usually at II or III Br 3 + 4). Syzygial pairs white.

Sp. 7 (St. 10) 30 internodes, 360 mm. 6 nodal joints without cirri. Full number of internodals in the 6th or 7th internode. Internodal joints: 9 : 2 cases, 10 : 14 cases, 11 : 9 cases (in 2 of the cases an internodal joint visible only on one side of the stem). Length of the internodes 11,5—14 mm. Interarticular pores to the 11th internode. Diameter of the stem 5,5—6,5 mm. The stem with somewhat stouter ridges than in the preceding specimens (similar to the distal part of the stem i Sp. 2).

Cirri 48 (XI) 51 mm., 54 (XIV), 56 mm., 40 (XIX) 46 mm., 37 (XX) 42 mm., 47 (XX) 52 mm., 33 (XXI) 38 mm., 44 (XXII) 46 mm., 47 (XXII) 51 mm., 43 (XXIII), 46 (XXIV) 50 mm. Extending over $2^3/_4$—$3^1/_4$ internodes. The thickness of the cirrus 1,5—1,8 mm.

B—s $2^1/_2$ × 5 mm. R—s 1 or 2 × 5 or 7 mm. I Br-s [1] 4 (1 + 2), [2] 5 (4 + 5), [3, 4, 5] 5 (1 + 2, 4 + 5), [6] 12 (9 + 10 or perhaps 13 : 1 + 2, 10 + , 11 the two first ossicles in this case almost completely grown

[1] 8+9 almost grown together.

together, probably I + II Br-s, see below); 15—30 mm. II Br-s 7 (3 + 4 : 2 cases, 2 + 3 : 1 case) 3 cases, 8 (3 + 4) 1 case, 9 (3 + 4) 3 cases, 11 (3 + 4) 2 cases, 13 (3 + 4 or 5 + 6) 2 cases, 20 (3 + 4, 14 + 15) 1 case; 18—34 mm. III Br-s 11 (3 + 4) 1 case, 13 (3 + 4) 5 cases, 14 (3 + 4, 11 + 12) 1 case, 15 (3 + 4) 3 cases, 17 (3 + 4 : 2 cases, 5 + 6 : 1 case) 3 cases, 18 (16 + 17) 1 case, 19 (3 + 4) 2 cases, 21 (3 + 4) 4 cases; 20—28 mm. Arms XLIV, total L 170 mm. Undivided part of the arm 100—110 mm. The transition to rudimentary p-s rapid: 13, 12, 5, 4, 4, 3, 2 . . . 6,5—1,5 mm. The arm-part with short p-s 30—40 mm.

P_1 (to the right on I Br 2 in 1 case and on I Br 1 : 2 cases; on I Br 3 in 3 cases; therefore the first p. 3 times to the right, 3 times to the left) 26; 35 mm. (on I Br 2), P_2 25; 29 mm., P_3 24, 25 mm., P_4 25; 23 mm., P_5 21; 19 mm., P_6 20; 17 mm. P_1 (on I Br 3) 23; 27 mm. The distal segments with rather strong, distal collars, P_{10} 13; 19 mm.

Disk 15—20 mm., coarsely granular. Colour in spirits white.

The XXth node has a short, deformed cirrus in the same radius as I Br = 12. The XXI and XXII nodes have no cirrus in this radius. The infranodal facet of the last node is not newly broken, but overgrown by some Bryozoan colony, which also occurs in the empty cirrus-facets on the XXIst and XXII^{d} nodes. The internodal joints at the XXth node are a little shorter than in the other parts of the stem. The I Br-series with 4 and 12 components stand alongside of each other and are normally directed upwards; the bases of the other ones are horizontally directed and 2 (the 4th and 5th) are a double-arm standing on 4 radial small ossicles. Thus the whole crown turns, as if it had been lying on the side on the 4th and 5th radius and by the continued growth had tried to rise into a vertical position. Possibly one might infer from what is said above that the crown was injured, when it was on the present XXth node and that at the same time the stem was broken at the present XXXth(last) node. If this is the case the abnormal divergences are to be explained by this accident.

In some specimens there occurs a large *Myzostoma*, probably *M. cirripedium*, v. Graff.

Example of arm-division and distribution of syzygies from Sp. 2:

In 1884 P. H. Carpenter in the Challenger Exp. mentioned the so called Vega-specimen as a separate species (in the table p. 344), and then the following year (Trans. Linn. Soc.) he discussed its separate position. According to him the species in question had higher internodal joints (both relatively and absolutely), which was of less diameter than in *M. interruptus* and regularly 6 radials, that is according to a more modern indication I Br 7 (1 + 2, 4 + 5). In the collections of the Uppsala museum there is also a specimen of a *Metacrinus* taken by the Vega-expedition in the Yedo-Bay at a depth of 65 fath. With regard to the diameter of the stem it approaches most to *M. rotundus* (the diameter is 6,0—5,8 mm.) The internodal joints are really somewhat higher (1,4—1,55 mm.) than in *M. rotundus*, where, according to my calculations, the h of the segments is 1,3—1,4 mm. (The last described specimen 7 differs by the segment being only 1,15—1,35 mm.)[1]. Nevertheless it does not seem advisable to distinguish the Vega-Specimen even as a variety on the basis of such vague features. (Observe that the original Vega-specimen is said to have a slender stem. If it is a young specimen of *M. rotundus* it is perfectly natural that the joints are rather high, at least relatively.) As to the »Radials» they are in the Vega-specimen at my disposal: 6 : 4 cases, 7 : 1 case (according to Carpenter's indication) or I Br 5 : 1 case, 6 (3 + 4) 3 cases, 7 (3 + 4) 1 : case (modern indication). II Br-s are in the case at hand 7 (3 + 4) 3 cases, 9 (3 + 4 or 4 + 5) 2 cases, 11 (3 + 4 or 2 + 3) 2 cases, the other ones broken. Thus it differs in no essential way from *M. rotundus*, to which species I therefore refer the »Vega-specimen» of P. H. Carpenter.

In the same work as he described *M. rotundus* P. H. Carpenter gives an account of the appearance of a stem-fragment of a *Metacrinus* from Singapore, which he calls *M. Stewarti*. This species is said to be distinguished from *M. rotundus* and *interruptus* (which it approaches most closely) by the statement that, »the joints have much more distinct horizontal ridges (p. 443). They give it a certain amount of resemblance to the stems of *M. Wyvilli* and *cingulatus*». The separate position of the species is evidently considered by the author to be most clearly demonstrated by the different appearance of the infranodal

[1] The h. of the joints is obtained by measuring the whole internode and dividing its L by the number of internodal joints.

faces of the nodal joint in *M. rotundus* (Pl. 52, fig. 3, not as stated in the description fig. 2) and in the debated stem-fragment (Pl. 52, fig. 15). According to the description this face in *M. Stewarti* (p. 444) is »quite different from the circular syzygial surface in *M. rotundus* (Pl. LII, fig. 3) and resembles that of *M. interruptus*. The syzygial surface of the nodal joint, however, is somewhat lobate as in the Vega-specimen». It appears from the figures that this stem very much resembles that of the above-described *Sp. 7*, which has more angular internodal joints with stronger ring-ridges than the typical *M. rotundus*. The importance that Carpenter attached to the appearance of the nodals and internodals has proved to be a little exaggerated and to some extent is subject to individual variation as well as the tubercles and ridges on the sides of the segments. At first I supposed that *M. Stewarti* ought to be considered a variety of *M. rotundus* and referred to *Sp. 7* here. By a comparison of the different stems in the collection I become, however, convinced that one ought not to separate *M. Stewarti* even as a variety. With regard to appearance and formation of ridges and tubercles the most distal part of the stem in *Sp. 2* agrees completely with *Sp. 7*, on the other hand the 11th—17th internodes are rounded, without radial ridges or corner-tubercles and therefore of the usual *M. rotundus*-type. *Sp. 3* has indistinct ring-ridges and sharply pentagonal segments in the 10th—16th internodes, but in the most distal internodes rounded segments without ridges again.

H. L. Clark in 1916 described a new species most closely related to *M. rotundus* as *M. cyaneus*. (Commonwealth of Austral. Fisheries Vol. 4, part. 1 p. 9). The Radials in this species are usually 6 (1 + 2, 4 + 5) but often 7 (1 + 2, 4 + 5); P_1 20 mm. $< P_2 < P_3$; P_4 25 mm. $= P_5$, P_6 shorter; the Br-s a little overlapping in the middle of the arm, the longest cirri with 60—64 cirrals, internodals 7—15 (usually 9—14). These are the most important features that the author gives to characterize the species. The only real differences between my specimens of *M. rotundus* and *M. cyaneus* are the number of cirrals and radials. The number of internodals are about the same in both species, the arms are in *M. rotundus* (the type) »tolerably smooth», in my specimens a little serrate in lateral profile, in *M. cyaneus* »the brachials have somewhat flaring distal margins . . becoming smooth near the armtip.» The L

of the proximal p—s is subject to too great a variation to be given any great importance (compare Sp. 5 and 7). Considering that the localities for the two species are widely separated, it is highly probable that the differences in the number of cirrals [45 in the type specimen, 47 mm.; (32—)43—53 in my specimens (37—)46—57 mm.; ?—60 or 64 in *M. cyaneus*, 50—65 mm.] and radials (5—6 in *M. rotundus* type; 4—12, usually 7, occasionally 5 or 8, in my specimens; and 4—7, usually 6, often 7, occasionally 5, in *M. cyaneus* will turn out in the future to be deviations of merely edafic value. For the present *M. cyaneus* ought to be considered as a variety of *M. rotundus*.

Metacrinus interruptus P. H. Carpenter.

Fig. 157, 158; Photo 13—15.

Syn. *Metacrinus interruptus* 1884 P. H. Carpenter Chall. Exp. Vol. 11, p. 367; Trans. Linn. Soc. London Ser. 2. Vol. 2, p. 438 ff.; 1902 (04) Sperry Proc. Mich. Acad. Sci, p. 195; 1908 A. H. Clark Proc. U. S. Nat. Mus. Vol. 34, p. 528; 1912 Crin. Ind. Oc. p. 269.

From St. 9 (1 sp.), 45 (10), 56 (4), 58 (2), 59 (3) = 20 specimens.

Sp. 1 (St. 45) For the L of the stem, the number and L of the internodes and internodal joints, and the thickness of the stem in this as in the following specimens see the table. The medium height of the internodal joints 1,1—1,3 mm. 3 proximal nodals without cirri. Full number of internodals in the 4th internode. The distal face of the nodal round. The intercirral tubercle on some nodals slightly prominent. Stem rounded, tolerably smooth, but with small radial prominences. Interarticular pores to the 8th internode.

Cirri 36 (VIIIth cirrus-bearing node) 32 mm., 37 (XI) 32 mm., 37 (XV). Extending over 2—2 1/4 internodes. I Br—s 7 (1 + 2, 4 + 5) 5 cases; 9 mm. II Br—s 9 (3 + 4) 1 case, 10 : 1 case, 11 (3 + 4) 8 cases; 10—12 mm. III Br—s 11 (3 + 4) 4 cases, 13 (3 + 4) 8 cases, 15 (3 + 4) 5 cases, 17 (3 + 4) 2 cases, 18 (3 + 4, 14 + 15) 1 case; 10—14 mm. IV Br 17 (3 + 4) 1 case; 13 mm. Arms XLI, total L 90 mm. L of the undivided arm 55 mm. Part of the arm with rudimentary p—s 20 mm. I Br series smooth. II Br—s and the following segment a little overlapping distally.

P_1 (in 5 cases to the right on I Br 2) 14; 12 mm. (1st segment short, 2d one largest), P_2 14; 10 mm., P_3 13; 8 mm. Brachial p—s 10; 6 mm. Disk coarsely granulated, 11,5 mm.

Sp. 2 (St. 45) The medium h of the internodals 1,3—1,45 mm. 4 nodal joints without cirri. Full number of internodals in the 5th internode. Internodal joints with rather prominent interradial swellings, which disappear in the 8th internode, and low ring-ridges on the sharply pentagonal stem. Interarticular pores to the 7th internode. Cirri 37; 32 mm.

I Br—s 7 (1 + 2, 4 + 5) 5 cases; 10 mm. II Br—s 9 (3 + 4) 1 case, 10: 1 case, 11 (3 + 4) 8 cases; 11 mm. III Br—s 11 (3 + 4) 1 case, 12: 1 case, 13 (3 + 4) 7 cases, 15 (3 + 4) 1 case, 19 (3 + 4) 3 cases, 20 (4 + 5, 13 + 14) 1 case, 21 (3 + 4: 2 cases, 4 + 5: 1 case, 5 + 6: 1 case) 4 cases, 23 (3 + 4) 1 case, 24 (3 + 4, 19 + 20) 1 case; 12—17 mm. Arms. XL, total L 100 mm. Undivided part of the arm 60 mm.; 20 mm. with rudimentary p—s.

P_1 (to the right on I Br 2 in 5 cases) 17; P_2 and P_3 17; P_5 14. Br—p. 14; 9 mm. One pinnule swollen by an entoparasitic *Myzostoma*.

Sp. 3 (St. 45) 5 nodals without cirri. Full number of internodal joints in the 3d internode. The segments tolerably smooth. The syzygial face of the nodal rounded. Interarticular pores to the 7th internode. Cirri 35 (IV) 28 mm., 36 (VII) 32 mm., 35 (IX) 29 mm. 8th—11th segments the longest L = 1 1/2 br.

B—s 1 × 1,5 mm., R—s 1,8×2,5 mm. I Br—s 7 (1 + 2, 4 + 5) 5 cases; 10 mm. II Br—s 9 (3 + 4) 7 cases, 11 (3 + 4) 3 cases; 10—12 mm. III Br—s 11 (3 + 4) 2 cases, 13 (3 + 4) 8 cases, 15 (3 + 4) 2 cases, 17 (3 + 4) 3 cases, 18 (3 + 4, the outer arm more weakly developed) 1 case, 19 (3 + 4) 3 cases, 20 (3 + 4, the new arm bending outwards on the outer side) 1 case; 10—15 mm. IV Br—s 15 (3 + 4) 3 cases, 17 (8 + 9) 1 case; 12—13 mm. Arms XLIV, total L 95 mm. Unbranched arm 55 mm. Part of the arm with rudimentary p—s 20—22 mm.

P_1 (to the right on I Br 2 in 4 cases) 11; 9 mm. Br—p 10; 6 mm.

In the same pot also 2 stem-fragments, one with 4 internodes, 11 internodals, L of the internodes 14 mm; diameter of the stem 3 mm. Cirri 36; 32 mm; the other with 6 internodes, 11—13 interno-

dals; L of the internodes 15—17 mm. Diameter of the stem 3,5—4,0 mm., Cirri 39; 36 mm.

Sp. 4 (St. 45) Infranodal joint pentagonally rounded. The cirrus socket hardly touches the supranodal joint. Interarticular pores to the 7th internode. 4 nodals without cirri. Full number of internodals in the 4th or 5th internode.

Cirri 41 (V) 26 mm., 39 (VIII) 31 mm., 42 (XI) 32 mm., 41 (XII) 31 mm., 37 (XV), 35 (XVIII) 28 mm. A dorsal carination from the 20th or 25th cirral.

B—s 1,3 × 1,8 mm. R—s 1,8 × 3,2 mm. I Br—s 7 (1 + 2, 4 + 5) 5 cases; 10,5 mm. II Br—s 9 (3 + 4) 1 case, 11 (2 + 3; 6 cases, 3 + 4; 3 cases) 9 cases; 9,5—11,5 mm. III Br—s 9 (3 + 4) 1 case, 13 (3 + 4) 7 cases, 15 (3 + 4) 3 cases, 19 (3 + 4) 1 case, 20 (3 + 4, 14 + 15 or 3 + 4, 17 + 18) 2 cases, 21 (3 + 4) 2 cases, 23 (3 + 4) 1 case, 24 (3 + 4, 14 + 15) 1 case; 7,5—21,5 mm. Arms XXXVIII, total L 90 mm. Unbranched part of the arm 50—55 mm., 15—20 mm. with rudimentary pinnules. Ex. of syzygies: 3 + 4, 34 + 35 or 3 + 4, 23 + 24, 36 + 37, 59 + 60 . . .

P_1 (to the right on I Br 2 in 5 cases) 13; 11 mm. P_2 similar. Br—p. 11; 7 mm. One P_2 with an entoparasitic *Myzostoma*.

Sp. 5 (St 45) 3 nodal joints without cirri. Full number of internodals in the 5th internode. Interarticular pores to the 9th internode. Stem rounded.

Cirri 45 (VIII) 35 mm., 45 (IX) 42 mm., 43 (XI) 40 mm., 42 (XIII) 37 mm., 42 (XVII) 36 mm., 40 (XX) 34 mm., 39 (XXII) 33 mm., 38 (XXVI) 27 mm.

B—s 1 × 2 mm. R—s 1,3—3 mm. I Br—s 6 (1 + 2, 4 + 5) 1 case, 7 (1 + 2, 4 + 5) 4 cases; 10—12 mm. II Br—s 7 (3 + 4) 1 case, 11 (3 + 4) 9 cases; 10—13 mm. III Br—s 10 (6 + 7, peculiar pinnulation $\left\{\text{III } \overline{1}\ \overline{2}\ \underline{3}\ \overline{4}\ \underline{5}\ 6 + \overline{7}\ \underline{8}\ \overline{9}\ 10 \left\{\begin{matrix}\text{Br}\\ \text{Br}\end{matrix}\right.\right.$) 1 case, 11 (3 + 4) 1 case, 12 (3 + 4, 8 + 9) 1 case, 13 (3 + 4) 5 cases, 14 (3 + 4, 10 + 11) 1 case, 15 (3 + 4) 1 case, 16 (3 + 4, 11 + 12) 1 case, 17 (3 + 4) 3 cases, 18 (3 + 4, 14 + 15: 2 cases or 3 + 4, 15 + 16: 1 case) 3 cases, 19 (3 + 4, 14 + 15) 1 case; 9—16 mm. IV Br—s 13 (3 + 4) 1 case, 14 (3 + 4, 11 + 12) 1 case, 18 (3 + 4, 15 + 16) 1 case; 13—16 mm. Arms XLI +,

total L. 130 mm. Unbranched arms 100 mm., 30–40 mm. with rudimentary p—s.

P_1 (to the right on I Br 2 in 4 cases) 19; many p—s with encysted *Myzostomas*.

Sp. 6 (St. 45) 4 nodals without cirri. Full number of internodal joints in the 5th internode. Interarticular pores to the 9th internode. Stem somewhat more rounded and smoother than in the preceding specimens.

Cirri 43 (X) 37 mm., 44 (XII) 40 mm., 42 (XV) 38 mm. First 6 cirrals short, L = 1/3 br.

I Br-s 5 (1 + 2, 4 + 5) 1 case, 7 (1 + 2, 4 + 5) 4 cases; 9—11 mm. II Br-s 9 (3 + 4) 5 cases, 11 (3 + 4) 5 cases; ± 10 mm. III and IV Br-s bent down, impossible to count. Arms XLIV, total L 110 mm. Unbranched part of the arms 80 mm.

P_1 (to the right on I Br 2 in 4 cases) 14—17; 12—13 mm. P_2 16—19; P_3 16; 10 mm. Br-p. 13; 7 mm. Disk 10—12 mm. Anal tubus 4 mm.

Sp. 7 (St. 45) 6 nodal joints without cirri. Full number of internodals in the 4th internode. Average height of internodal joints 1,3—1,5 mm. A slight intercirral tubercle to about the XVth node. The distal face of the nodal joint lobated. Ring-ridge inconspicuous. Interarticular pores to the 8th internode.

Cirri 41 (VI) 35 mm., 42 (IX) 37 mm., 41 (XI) 34 mm., 41 (XIV) 36 mm., 39 (XVII) 35 mm., 40 (XIX) 34 mm.

B—s 1,3 × 2 mm, contiguous. R—s 2 × 4 mm. I Br-s 7 (1 + 2, 4 + 5) 5 cases; 12 mm. II Br-s 11 (3 + 4) 10 cases; 14 mm. III Br-s 11 (3 + 4) 3 cases, 13 (3 + 4) 3 cases, 15 (3 + 4) 4 cases, 17 (3 + 4) 3 cases, 19 (3 + 4) 5 cases, 21 (3 + 4) 2 cases; 11—19 mm. IV Br-s 13 : 1 case, 15 : 2 cases, 17 : 1 case, 21 : 1 case, all with a syzygy between 3 + 4; 12—14 mm. Arms XLV, total L 115 mm. Unbranched part of the arm 75 mm.. Syzygies with an interval of 17—25 oblique articulations.

P_1 (to the right on I Br 2 in 4 cases) 16; 14 mm. Br-p. 13; 7 mm.

Sp. 8 (St. 45) 3 nodals without cirri. Full number of internodals in the 5th internode. Interarticular pores to the 9th internode. Infranodal joint rounded. The segments are remarkably smooth and rounded.

Cirri 44 (IX) 36 mm., 41 (XIII) 35 mm., 41 (XVI) 32 mm., 39 (XVIII) 31 mm., 38 (XX) 28 mm.

B—s 1 × 2 mm., R—s 1,3 × 3 mm. I Br-s 7 (1 + 2, 4 + 5) 4 cases, 8 (1 + 2, 4 + 5) 1 case; 11 - 13 mm. II Br-s 9 (3 + 4 : 2 cases, 5 + 6 1 case) 3 cases, 10 : 1 case, 11 (3 + 4) 6 cases; 11—13 mm. III Br-s 13 (2 + 3 : 1 case, 3 + 4 : 8 cases) 9 cases, 15 : 1 case, 17 : 4 cases, 19 : 6 cases, syzygies between 3 + 4; 12—18 mm. IV Br-s 13 (3 + 4) 1 case, 17 (3 + 4) 1 case, 28 (3 + 4, 15 + 16) 1 case; 12—+ 25 mm. Arms XLIII, total L 130 mm. Unbranched part of the arms 95 mm., with about 120 Br-s. Syzygies with an interval of 8—23 oblique articulations. 30—35 mm. with rudimentary p—s.

P_1 (to the right on I Br 2 in 3 cases) 20—21; 18 mm. P_2 22; 17 mm. P_3 21; 14 mm. Br-p. 16; 8,5 mm. The syzygial pairs lighter coloured.

Sp. 9 (St. 45) 4 nodals without cirri. Full number of internodals in the 4th internode. Interarticular pores to the 7th internode.

Cirri 42 (VII) 35 mm., 42 (IX) 34 mm., 41 (XIII) 35 mm., 38 (XV) 30 mm. Extending over 1 1/2—2 internodes.

I Br-s 7 (1 + 2, 4 + 5) 5 cases; 11 mm. II Br-s 9 (3 + 4) 4 cases, 11 (3 + 4 : 3; 4 + 5 : 2; 6 + 7 : 1) 6 cases; 10—12 mm. III Br-s 11 (3 + 4) 1 case, 12 : 2 cases, 13 (3 + 4 : 3; 4 + 5 : 1; 5 + 6 : 1) 5 cases, 14 : 1 case, 15 (3 + 4) 2 cases, 17 (3 + 4) 2 cases, 19 (3 +4) 1 case, 22 (3 + 4, 20 + 21) 1 case, 23 (3 + 4) 2 cases, 25 (3 + 4) 1 case; 10—23 mm. IV Br-s 17 (3 + 4 : 2; 11 + 12 : 1) 3 cases, 19 (5 + 6) 1 case; 12—14 mm. Arms XLII +, 110 mm. Unbranched part of the arms 70 mm. Syzygies with an interval of 12—30 oblique articulations.

P_1 (to the right on I Br 2 in 5 cases) 15; 11 mm. Br-p. 14; 6,5 mm.

Sp. 10 (St. 59) 2 nodals without cirri. Full number of internodals in the 6th internode. Interarticular pores to the 10th internode. Internodal joints pentagonally rounded with a slight ring-ridge. No intercirral tubercle.

Cirri 38 (XI) 37 mm., 39 (XIII), 37 (XIV) 34 mm., 39 (XVIII), 38 (XX) 35 mm., 38 (XXII), 37 (XXIII) 33 mm. The dorsal longitudinal carination is indistinct.

B—s 1 × 2 mm. R—s 1,5 × 4 mm. I Br-s 7 (1 + 2, 4 + 5) 5 cases; 10 mm. Breadth 5 mm. II Br-s 9 (3 + 4) 2 cases, 13 (3 + 4) 3 cases; 11—12 mm. The other ones broken. III Br-s 11 (3 + 4) 1 case, 13 (3 + 4) 3 cases, 16 (3 + 4, the outer arm somewhat weaker) 1 case, 19 (3 + 4) 1 case, 26 (3 + 4, 22 + 23) 1 case; 13—25 mm. IV Br-s 13 (3 + 4) 1 case, 17 (3 + 4) 2 cases; 12—16 mm. The arms partly broken, total L 120 mm. A complete radius with X arms. Unbranched part of the arms 85 mm.

P_1 (to the right on I Br 2 in 3 cases) 17; 16 mm.; P_1 (to the right on I Br 3 in 2 cases) 15; 14 mm. Br-p. 14; 9 mm.

Sp. 11 (St. 59) 4 nodal joints without cirri. Full number of internodals in the 7th internode. Interarticular pores to the 12th internode.

Cirri 48 (IX) 47 mm., 46 (XII) 50 mm., 44 (XVI) 49 mm., 45 (XVIII) 49 mm., 41 (XXI) 42 mm. Cirri extending over 2 1/2—3 internodes.

B—s 1 × 1,5 mm., small, not contiguous. R—s 2 × 4 mm. I Br-s 7 (1 + 2, 4 + 5) 4 cases; 12 mm. One radius broken. II Br-s 7 (3 + 4) 1 case, 11 (3 + 4) 2 cases; 9—13 mm. The other ones broken. III Br-s 11 (3 + 4) 1 case, 13 (3 + 4) 2 cases, 20 (3 + 4, 13 + 14 or 3 + 4, 15 + 16) 2 cases; 13—22 mm. IV Br-s 16 (3 + 4, 11 + 12) 1 case, 19 (1 + 2, 4 + 5, 15 + 16) 1 case; 15—16 mm. Arms 155 mm. (A complete radius with IX arms.) Unbranched part of the arms 100 mm.; 25—30 mm. with rudimentary p—s. Syzygies with an interval of 5—8 oblique articulations.

P_1 (to the right on I Br 2 in 4 cases) broken. P_1 (to the left on I Br 3) 24; 23 mm., P_2 27; 23 mm. Br-p. 15; 10 mm.

Sp. 12 (St. 59) 6 nodal joints without cirri. Full number of internodals in the 5th internode. Interarticular pores to the 8th internode. Stem smooth, pentagonal, the joints proximally with a slight radial concavity. The distal face of the nodal joint almost round. Cirri 38—39; 28—29 mm.

B—s 1 × 1,2 mm., laterally contiguous. R—s 1 × 2,5 mm. I Br-s 5 (1 + 2, 4 + 5) 1 case, 7 (1 + 2, 4 + 5) 4 cases; 8—11 mm. II Br-s 9 (3 + 4) 5 cases, 11 (3 + 4) 4 cases; 11—13 mm. The 10th radius broken. III Br-s 11 (3 + 4) 2 cases, 13 (3 + 4) 7 cases, 15 (3 + 4) 2 cases, 16 (3 + 4) 1 case, 17 (3 + 4) 2 cases, 19 (3 + 4 : 2;

3 + 4, 7 + 8 : 1 case) 3 cases; 13—18 mm. IV Br-s 17 (3 + 4) 1 case, 18 (3 + 4) 1 case, 23 (3 + 4, 13 + 14, 20 + 21) 1 case; 15—20 mm. Arms on a perfect specimen probably ± XLV; total L 115 mm. Unbranched part of the arm 80 mm. Syzygies with an interval of 6—12 oblique articulations. The Br segments after II Brax with somewhat overlapping distal margins.

P_1 (to the right on 1 Br 2 in 5 cases) 20; 16 mm., [P_1 (on 1 Br 3) 16; 13 mm.] P_2 19; 14 mm. Br-p. 14; 6—7 mm.

Sp. 13. (St. 56) 4 nodal joints without cirri. Full number of internodals in the 4th internode. Interarticular pores to the 7th internode. The distal face of the nodal joint pentagonally rounded.

Cirri 29 (V) 27 (VI) 28 (VII); 21—22 mm. 4th segment L = br, 5th—8th segments L = 1²/₃ br. Cirri extending over 1¹/₂—2 internodes.

B—s 0,6 × 1,0 mm. soldered together laterally. R—s 1 × 2 mm. a little bent outwards, thus forming an angle with the basals. I Br—s 7 (1 + 2, 4 + 5); 8 mm. in the 3 perfect radii. II Br—s 11 (3 + 4) 2 cases, 13 (3 + 4) 1 case, 14 (3 + 4) 1 case; 10—11 mm.; the other ones broken. III Br—s 13 (3 + 4) 3 cases, 15 (3 + 4) 1 case, 19 (3 + 4) 2 cases, 20 (3 + 4, 16 + 17) 2 cases; 9—14 mm. IV Br—s 18 (3 + 4, 13 + 14 : 1; 3 + 4, 14 + 15 : 1; 3 + 4, 16 + 17 : 1) 3 cases. All new arms on the inside of IV Brax reinforced p—s, very small with 5—6 segments, 2 mm. The outer arms = the original arms: 12 mm.

Arms in the complete specimen probably XLV, total L 55 mm.: 12 mm. with rudimentary p—s. The small, new arms appear on the border to the rudimentary pinnules. (The preceding pinnule of the original arm with 7, the succeeding one with 3, and the ones that then follow with 2 segments; the young arm itself with 6—7 segments). These new arms differ from the other adjacent p—s by the distal spinosity and by supporting one or two small p—s with 2—3 segments: The syzygy between Br 3 and 4 is usually developed.

P_1 (to the right on I Br 2 in 5 cases) 9; 6 mm. Br-p. 9; 5,5 mm. Example of arm-branching:

I 1+2 3 4+5 6 7
- II. 3+4. 11
  - III. 3 + 4. 13
    - IV. 3 + 4. 13 + 14. 18
      - Br. 3+4. 8+9. 18+19. 25
      - Br. 3 + 4. . 7
    - Br. 3 + 4. 16 + 17. . . . 38
  - III. 3 + 4. 19
    - Br. 3 + 4. 31
    - Br. 3 + 4. 41
- II. 3+4. 13
  - III. 3 + 4. 16 + 17. 20
    - Br. . 3 + 4. . . . 37
    - Br. . 3 + 4. . . . 25
  - III. 3 + 4. 13
    - Br. 3 + 4. 32
    - IV. 3 + 4. 14 + 15. 18
      - Br. . 6
      - Br. 3+4. 14+15. 17+18. 26

Sp. 14 (St. 56) Interarticular pores to the 6th internode. 5 internodals without cirri. Full number of internodals in the 3d internode.

Cirri 34 (VIIth cirrus-provided node); 34 (IX) 22 mm., 32 (XII).

B—s $1 \times 1{,}3$ mm. R—s 1×3 mm. forming an angle with the B—s. The arms broken. P_1 (to the right on I Br 2 in 5 cases) 12; 9 mm. Disk 7 mm. Anal cone 5 mm.

Sp. 15 (St. 56) 3 nodal joints without cirri. Full number of internodals in the 3d internode. Interarticular pores to the 6th internode. The distal internodes often have one of the middle internodal joints provided with tubercles; this is an indication of the formation of a nodal joint. One such middle node is perfectly developed between the 2d and 3d internodes, counted from the distal end of the stem. (Here therefore only 4 and 3 internodal joints appear.) The distal stem-joints almost perfectly round.

Cirri 34 (IV) 22 mm., 32 (VII), 30 (XI), 30 (XIII) 17 mm., 28 (XV). The cirrus-sockets of the distal nodals do not quite reach to the proximal border of the joint. Nevertheless, the usual type is to be found already at the IXth node, where the joints also begin to become somewhat pentagonal.

The arms broken. P_1 (to the right on I Br 2 in 3 cases) 12; 7 mm. Disk 6 mm. Anal cone 5 mm.

Sp. 16 (St. 56) 8 nodals without cirri. Full number of internodals in the first internode. Interarticular pores to the 2d internode. The number of internodals when counted proximo-distally runs as fol-

lows: 12, 11, 11, 9, 8, 7, 7, 7, 5. The internodal joints are longer than broad. Also the nodal joints are long (compare photo 14). The cirrus-sockets do not reach the proximal border of the nodal. The two most distal internodes with attempts at formation of nodal joints on some joints.

Cirri 22 (II) 9,5 mm., 19 (III) 11 mm., 19 (V) 10 mm. 2d cirral L = br. 4th—8th one L = 2 br.

B—s 0,5 × 0,5 mm. R—s h = 1,3 mm., br (at the base) 1 mm., forming an angle with the basals. I Br-s 7: (1 + 2, 4 + 5) 2 cases, 8 (1 + 2, 3 + 4) 1 case, 9 (1 + 2, 4 + 5) 2 cases; 5—7 mm. II Br-s 10: 4 cases, 11 (2 + 3: 1; 3 + 4: 3; 4 + 5: 1) 5 cases, 12: 1 case; 7—8 mm. Arms XX; 18 mm. Unbranched part of the arm 1—4 mm. P_1 (to the right on I Br 2 in 5 cases) 9; 3,7 mm. P_2 11; 4,2 mm.

Example of arm-branching:

$$\text{I } 1+2\,\bar{3}\,4+5\,\bar{6}\,7\,\bar{8}\,9 \begin{cases} \text{II } \bar{1}\ \underline{2} \ldots\ldots\ldots \bar{9}\ 10 \begin{cases} \text{Br } \bar{1}\ \underline{2}\ 3+\bar{4}\ldots 8 \\ \text{Br } \underline{1}\ \bar{2}\ 3+\underline{4}\ldots 7 \end{cases} \\ \text{II } \underline{1}\ \bar{2}\ 3+\underline{4}\ldots\underline{10}\ 11 \begin{cases} \text{Br } \bar{1}\ \underline{2}\ 3+\bar{4}\ldots 7 \\ \text{Br } \underline{1}\ \bar{2}\ 3+\underline{4}\ldots 9 \end{cases} \end{cases}$$

The inner arms a little shorter, 2 mm., the outer arms about 3 mm. Disk reaching to I Br 2.

Sp. 17 (St. 58) 6 nodal joints without cirri. Full number of internodals in the 3d internode. Interarticular pores to the 4th internode. Number of internodal joints counted proximo-distally as follows: 6, 9, 10, 9, 8, 8, 9, 8, 7, 8, 7, 6.

Cirri 27 (IV) 15 mm., 23 (VI) 13 mm., 24 (VIII) 11 mm., 21 (X) 10 mm., 19 (XII) 8 mm.

B—s pentagonal, directed straight upwards. R—s forming with the B—s an angle of about 135°. I Br—s 7 (1 + 2, 4 + 5) 5 cases; 6 mm. II Br—s 11 (3 + 4: 2; 2 + 3: 1) 3 cases; 12 (2 + 3, 7 + 8: 1; 2 + 3, 5 + 6: 1; 2 + 3, 6 + 7: 1; 3 + 4, 6 + 7: 1) 4 cases, 13 (3 + 4) 1 case, 14 (3 + 4, 8 + 9) 1 case; 7—10 mm. III Br—s 14 (3 + 4, 10 + 11: 2; 3 + 4, 11 + 12: 1; 3 + 4, 12 + 13: 1; 3 + 4, 13 + 14: 1) 5 cases, 15 (3 + 4) 2 cases, 16 (3 + 4, 8 + 9) 1 case, 20 (3 + 4, 10 + 11) 1 case; 7—9 mm. Arms XXVIII, in the complete specimen, probably, XXIX; total L 30

mm.; last 5 mm:s with rudimentary p—s. The new arms on the inside of III Brax very short, about 1 mm. (the main arm from the same III Brax 5 mm.) An outer ramification in one case shorter, though with normal pinnulation, elsewhere always shorter branches on the inside.

Example of arm-branching:

III . . 3 + 4 . . . 10 + 11 . . 14	Br . . 3 + 4 . . . 12	5 mm.
	Br 1 2 3 4 5	1 mm.
Br . . 3 + 4 . . . 12 + 13 22		

P_1 (to the right on I Br 2 in 4 cases) 9; 4,5 mm. P_2 9; P_3 10; P_6 10; 5 mm.

Disk 2—3 mm. in diameter with calcareous plates. No orals.

Sp. 18 (St. 58) 3 nodals without cirri. Full number of internodals in the 4th internode. Interarticular pores to the 7th internode.

Cirri 32 (VI) 21 mm., 30 (VIII) 19 mm. 4th segment cubical.

I Br—s 7 (1 + 2, 4 + 5: 3 cases; 1 + 2, 3 + 4: 2 cases) 5 cases; 8 mm. II Br—s 9 (3 + 4) 4 cases, 11 (3 + 4: 4; 2 + 3: 2) 6 cases; 8—10 mm. III Br—s 11: 1 case, 13: 7 cases, 15: 2 cases, 17: 7 cases, 18 (3 + 4) 1 case, 19: 2 cases, everywhere the syzygies 3 + 4; 8 — 12 mm. Arms XL, total L 55 mm. Rudimentary p—s on the last 12—15 mm.

P_1 (to the right on I Br 2 in 4 cases) 11; 7 mm. P_3 11; 5 mm. Br—p. 9; 5 mm.

To this species probably also belongs *Sp. 19* (St. 9) 3 nodals without cirri. Full number of internodals in the 6th internode. Interarticular pores to the 10th internode. The segments are rounded with a slight ring-ridge. Distally of the fixing point for the cirral there is a slight, swollen ridge effaced at the middle. The cirrus-socket extends up over the distal part of the supranodal but does not reach the infranodal joint.

Cirri 43 (XI) 45 mm., 40 (XVIII) 40 mm. Extending over 2—2 1/4 internodes.

B—s 1,8 × 3,7 mm., laterally not contiguous, except on the supernumerary side. There are 6 R—s.

I Br—s 4 (1 + 2) or 1 + 2 3 4 +; the other ones broken in the 1st syzygy.

Sp. 20 (St. 45) 4 nodal joints without cirri. Full number of internodal joints in the 5th internode. Interarticular pores to the 10th internode. Between the internodal joints there are in several cases incomplete internodals, only visible, however, on one side of the stem. The joints pentagonally rounded with low ring-ridges.

Cirri 45—48; 37—45 mm. The 8th segment cubical.

I Br 7 (1 + 2, 4 + 5), 1 case, 8 (1 + 2, 4 + 5), 1 case, the other arms bent downwards and their dorsal parts hidden.

Arms LII; 160 mm. Rudimentary p—s on the most distal 30 mm. of the arms.

P_1 to the right on I Br 2 in 4 cases; in one case the reverse. Disk 14 mm. Anal funnel 5 mm. Colour in life bright green.

To a certain extent forming a transition to the form *ornatus*.

Metacrinus interruptus forma ornatus.

From St. 9 (1), 59 (1) = 2 specimens.

Sp. 21 (St. 9) 4 nodals without cirri. Full number of internodals in the 7th internode. Interarticular pores to the 11th internode. Stem proximally narrower. The joints, especially the distal ones, markedly pentagonal. Every second internodal joint provided with an unbroken ring-crista. The infranodal face of the nodal joint lobate. The supranodal joint somewhat incised by the cirrus socket. The nodal joint a little thicker than the other joints. No distinct intercirral tubercle.

Cirri 41 (XI) 42 mm., 41 (XV) 40 mm. Extending over 3 internodes. 8th cirral L = br. The dorsal carination divided in a distinct proximal and distal portion.

B—s laterally not contiguous. R—s 1,7 × 4,8 mm. The arms broken at the first syzygy (1 Br 1 +).

Sp. 22 (St. 59) 5 nodals without cirri. Full number of internodals in the 5th internode. Interarticular pores to the 8th internode. The joints decidedly pentagonal. Intercirral tubercle well developed. Every second internodal joint with interradial tubercles. 8th—10th internodes a little smoother.

Cirri 39 (IX) 32 mm., 40 (X) 34 mm., 34 (XII) 28 mm. Extending over 2 internodes. 6th cirral L = br.

B—s 1,5 × 2,5 mm., R—s 1,5 × 3,5 mm. I Br—s 6 (1 + 2) 1 case,

7 (1 + 2, 4 + 5) 4 cases; 12 mm. II Br—s 7 (3 + 4) 3 cases, 9 (3 + 4) 2 cases, 11 (3 + 4 : 2; 2 + 2 : 1) 3 cases; 9—13 mm. III Br—s 9 (3 + 4) 1 case, 11 (3 + 4) 3 cases, 12: 1 case, 13 (3 + 4) 5 cases, 15 (3 + 4) 3 cases, 17 (3 + 4) 1 case, 19 (3 + 4) 2 cases; 9—17 mm. IV Br—s 15 (3 + 4) 4 cases, 16 (4 + 5, 10 + 11) 1 case, 17 (3 + 4) 2 cases, 19 (3 + 4) 1 case, 21 (3 + 4) 1 case, 23 (3 + 4) 1 case, 25 (3 + 4) 1 case, 27 (3 + 4) 1 case; 14—24 mm. V Br—s 15: 1, 17: 1, 19: 2 cases (syzygy between 3 + 4); 15—19 mm. Arms partly broken, in a complete specimen probably about LX; total L 105 mm. Unbranched arms 60 mm.; 10—20 mm. with rudimentary p—s. The number of the segments of the p—s at the transition 11, 11, 9, 8, 7, 4, 3, 2, 2. Syzygies with an interval of about 20 oblique articulations.

P_1 (to the right on I Br 2 in 3 cases) 16—17; 12 mm., P_5 15; 9 mm., P_{10} 14; 8 mm.

Disk 13 mm. Anal cone 4,5 mm.

The present material of *M. interreptus* forms an extraordinarily fine and interesting series. *Sp. 16* may be the youngest known stage of recent pentacrinoids[1] or at least of the genus *Metacrinus*.

As to the thickness-growth of the stem one can observe that the increase is most rapid among the young specimens and generally decreases with growing age. When the diameter of the stem is less than 1 mm. the stem thickens with 0,1 mm. for a length-growth of about 15 mm. From 1,0—2,5 mm. generally the same enlargement of the diameter of the stem is reached with an length-growth of 25 mm. (An exception is, however, Sp. 13, but one must notice that the preserved part of the stem is relatively short and the whole thickness-growth only 0,1 mm.; the divergence might therefore be ascribed to errors of measurement.) From 2,5—3,0 mm. the diameter of the stem increases with 0,1 mm. on 30—35 mm. Between 3,0 and 4,0 mm. the same growth takes place on 60—120 mm. and over 4,0 mm. an equivalent thickening is attained on a length-growth of about 80 mm. Exceptions are *Sp. 11* with a thick stem, but rapid growth (0,1 mm. pro 33 mm.) and *Sp. 21*, where the diameter of the stem is proximally decreasing. A

[1] A figure of a very young specimen of *Isocrinus decorus* of about the same size is also presented by A H. Clark in 1908 (Proc. U. S. Nat. Mus. Vol. 35, p. 88; a stem fragment) and in 1915 (Monograph p. 205; the same stem, here the figure is correctly placed) and by H. L. Clark in 1918 (Bull. Lab. Nat. Hist. Iowa Vol. 7, Rep. Crin & Echin. of the Bahama Exp.).

Number of Specimen and Station	Internodes		Internodal joints		Diameter of the stem	Cirri		I Br	II Br	Arms		P_1		P_{Br}	
	N	Total L	N	L		S	L			N	Total L	S	L	S	L
Sp. 1 (St. 45)	18	205	$10^3 11^{12}$	11—14,3	3,0—3,2	36—37	32	7^5	9—11	40	90	14	12	10	6
Sp. 2 (St. 45)	9	110	$11^4 12^1$	14,5—16	3,7—3,7	37	32	7^5	9—11	40	100	17	—	14	9
Sp. 3 (St. 45)	9	100	$11^4 12^3$	13,5—15	2,7—3,0	35—36	29—32	7^5	9—11	44	95	11	9	10	6
Sp. 4 (St. 45)	18	225	$11^8 12^5 13^1 14^1$	12,5—16,5	2,6—3,0	35—42	28—32	7^5	9—11	38	90	13	11	11	7
Sp. 5 (St. 45)	26	345	$10^4 11^{18}$	12,5—15	2,8—3,6	38—45	27—42	$6^1 7^4$	7—11	41 +	130	19	—	—	—
Sp. 6 (St. 45)	14	160	11^{10}	14—15	4,0—4,2	42—44	37—40	$5^1 7^4$	9—11	44	110	14—17	12—13	13	7
Sp. 7 (St. 45)	23	345	$11^{12} 12^6 13^2$	14,7—17,5	3,5—3,7	39—42	34—37	7^5	11	45	115	16	14	13	7
Sp. 8 (St. 45)	20	300	$11^3 12^5 13^5 14^3$	14,5—18,5	3,3—3,8	38—44	28—36	$7^4 8^1$	9—11	43	130	20—21	18	16	8,5
Sp. 9 (St. 45)	17	285	$12^4 13^3 14^4 15^3$	15—20	3,0—3,3	38—42	30—35	7^5	9—11	42 +	110	15	11	14	6,5
Sp. 10 (St. 59)	26	360	$10^1 11^{17} 12^3$	14,5—16,5	3,7—4,0	37—39	33—37	7^5	9—11	± 45	120	17	16	14	9
Sp. 11 (St. 59)	23	300	$10^{14} 11^3$	13—16	4,1—5,0	41—48	42—50	7^4	7—11	± 45	155	24	23	15	10
Sp. 12 (St. 59)	19	210	$10^8 11^7$	11,5—13	2,7—3,5	38—39	28—29	$5^1 7^4$	9—11	± 45	115	20	16	14	6-7
Sp. 13 (St. 56)	7	57	$11^1 12^3$	11,3—12,5	1,8—1,9	27—29	21—22	7^3	11—14	± 45	55	9	6	9	5,5
Sp. 14 (St. 56)	12	130	$10^1 11^9$	12—13	1,8—2,3	32—34	22	—	—	—	—	12	9	—	—
Sp. 15 (St. 56)	15	120	$3^1 4^1 7^2 8^1 10^7 11^1$	3—11,5	1,5—2,0	28—34	17—22	—	—	—	—	12	7	—	—
Sp. 16 (St. 56)	9	60	$5^1 7^3 5^1 8^1 11^2 12^1$	3—7,5	0,4—0,8	19—22	9,5—11	$7^2 8^2 9^1$	10—12	20	18	9	3,7	—	—
Sp. 17 (St. 58)	12	85	$6^1 7^2 8^1 9^2 10^1$	5—8	0,6—1,2	19—27	8—15	7^5	11—14	28 +	30	9	4,5	10	5
Sp. 18 (St. 58)	7	47	$11^3 15^1$	10—12	1,5—1,7	30—32	19—21	7^5	9—11	40	55	11	7	9	5
Sp. 19 (St. 9)	17	230	$10^2 11^{10}$	15,5—17,5	4,7—5,0	40—43	40—45	4^1	—	—	—	—	—	—	—
Sp. 20 (St. 45)	23	390	$11^8 12^4 13^5 14^1 15^1$	16—21	4,4—4,9	45—48	37—45	$7^1 8^1$	—	52	160	—	—	—	—
Sp. 21 (St. 9)	20	205	$9^1 10^6 11^6 14^1$	11—14	5,1—4,8	41	40—42	—	—	—	—	—	—	—	—
Sp. 22 (St. 59)	13	150	11^9	14—14,5	3,3—3,5	34—40	28—34	$6^1 7^4$	7—11	± 60	105	16—17	12	14	8

full-grown specimen therefore continues the length-growth of the stem, but the diameter of the stem is very little or not at all increased and might (in old specimens?) even decrease. An full-grown *M. interruptus* migth thus have a total stem-length of 2—2,5 metres, but from what is mentioned above it is probable that in older specimens it might be considerably larger. The previously described specimens of *M. rotundus* probably have much longer stems, for these only show an inconspicuous or no increase of the diameter. The fact that large specimens exhibit a decrease of the diameter of the stem (cf. *M. rotundus* Sp. 4, *M. interruptus* Sp. 21) has also been observed by Döderlein (Siboga Exp. Vol. 42 A, p. 29 ff.). I have not established any periodicity in the growth of the stem-diameter in *M. interruptus*.

The proximal segments of the cirrals are short and discoidal, but the number of these short segments is evidently a function of the age of the animal. In e. g. Sp. 16 cirral 2 is already as long as broad, in Sp. 17 the 3^{d}, in Sp. 18 the 4th, in Sp. 14 the 5th, in Sp. 5 the 6th, in Sp. 6 the 7th and in Sp. 19 the 9th segment is cubical. In the corresponding specimens the number of cirrals and their L are on an average 20 (10 mm.), 23 (12 mm.), 31 (20 mm.), 33 (22 mm.), 42 (35 mm), 41 (38 mm.), 42 (43 mm.). — The distal cirrals are, as in the comatulids, longer in younger specimens; e. g. Sp. 16 has the L of the 4th—8th cirrals = 2 br (cf. Sp. 3). The same prolongation is also seen in the stem-joints, which in the youngest specimens are longer than broad. Therefore the cirrus-sockets on the nodals in the young specimens do not reach the proximal border.

The interarticular pores cease very constantly at the 7th or 8th, in some rare cases in large specimens (10, 19, 20, 21) not until the 9th or 10th internodes. In the very young specimens 14—17 the pores have disappeared already at the 2^{d} to 6th internodes — a manifestation af more rapid stem-growth.

Full number of internodal joints in the largest specimens (6, 10, 11, 19, 20, 21) appears in the (5th—)6th—7th internodes, on the other hand in the smallest specimens already in the (4th—)3^{d} or even in the first internode (Sp. 3, 13—18).

Sperry has doubted whether *M. rotundus* and *M. interruptus* should be considered as different species. I grant he is right inasmuch as there is no essential difference in the number of components

of the II and III Br-series in the two species. The number of II Br—s, however, in *M. rotundus* is somewhat more variable (2—7—11—21) than in *M. interruptus*, where, with rare exceptions, it stops between 9 and 11. Further I quite agree with SPERRY in his statement about the variability of the infranodal face.

But — nevertheless — there are some differences. In the original specimens of *M. rotundus* and *interruptus* there was measured a stem-diameter of 5,0 and 4,25 mm. respectively. This difference might seem slight, but my measurements of both the species show that it is of rather great importance: only 4 of the 22 specimens of *M. interruptus* have a stem-diameter of more than 4,2 mm., and these 4, evidently very old specimens, do not attain a stem-thickness of more than 5,1 mm. In *M. rotundus*, on the other hand, there are only 2 specimens (with relatively rapid growth of the stem) which do not come up to 6 mm. (CARPENTER's specimen is evidently to be compared with the Bockian Sp. 5); all the full-grown ones have a diameter of the stem of 6,0—6,7 mm.

M. rotundus is therefore a larger species and from this some other differences also follow. Thus the cirrals often number 50—55, contrary to *M. interruptus*, where they very seldom exceed 45. The interarticalur pores in the latter species disappear at the 7th or the 8th internodes (seldom at the 9th or 10th), in the former species they disappear first at the 9th—12th internodes.

As to the number of the ossicles in the I Br-series a comparison between the two species turns out thus: *M. rotundus* has 7 I Br-s in 26 cases, 8 or 5 each in 4 cases; 4, 10 or 12 each in 1 case. (It is, however, to be noticed that here are included the figures from the abnormal Sp. 7). *M. interruptus* has 7 I Br-s in 76 cases, 8 in 5 cases, 5 and 6 each in 2 cases, 4 and 9 each in 1 case. (Here the young specimen 16, however, contributes 3 figures differing from 7). Thus it is impossible to deny that in *M. rotundus* there is a somewhat greater variability in the number of the I Br—s.

The cirri extend over $2^1/_2$—$3^1/_2$ internodes in *M.rotundus*, over $1^1/_2$—$2^2/_3$ internodes, only exceptionally over 3 internodes, in *M. interruptus* (Sp. 11, 21). (The last-mentioned L only occurs in the largest specimens).

I have therefore preserved the two species as different types of species value.

The newly proposed form *ornatus* I might possibly have been able to consider as a variety, if I had had more plentiful material at my disposal. It differs from the chief species by the well developed ornamentation of the internodal joints and, probably, by a somewhat greater number of arms (Sp. 22 with about LX arms). Nevertheless it might be considered that the greater number of arms is a mere chance; cf. the 20th specimen (observe also that Sp. 20—22 are rather large specimens). Therefore, keeping in view the appearance of the stems in *M. rotundus*, I will not set up a new variety based only onthe ornation of the internodals and because of that I have preferred only to note the new type as a »form».

I do not consider that the change in the number of internodals in the above-described specimens causes any sub-dividing into varieties. (Sp. 8, 9 and 20 show specially high figures). It is to be noticed that the very youngest specimens have a smaller number of internodal joints. That is because the middlemost internodal joints have got a complete cirrus-whorl. There are often on the other internodals too small prominences where the cirrus ought to have been inserted if the joint had been a nodal. I do not doubt that the still unknown, very small young forms of this family will turn out to have all or most internodal joints provided with cirrus-like prominences, thus appoaching the type that is shown in the distal part of the stems of *Rhizocrinus*. The differentiation into nodal and internodal joints is certainly a secondary phenomenon. —

List of the stations where Crinoids were obtained.

Chronologically arranged and numbered.

Station 1 Japan, Shimonoseki, on the shore at low tide, $^{30}/_{3}$ 1914; formol-spirit. *Compsometra serrata* 4 sp.

St. 2 Japan, Sagami, Misaki, Aburazubo 2—3 Metres, $^{19}/_{4}$ 1914. *Compsometra serrata* 3 sp.

St. 3 Japan, Sagami, Misaki, on the shore, low tide $^{4}/_{5}$. Formol-spirit. *Compsometra serrata* 1 sp.

St. 4 Japan, Sagami, Misaki, 150 fathoms (the Metacrinus-shoal) $^{5}/_{5}$; 96 % Alc. *Comissia parvula* 1 sp. *Toxometra æquipinna* 2 sp. *Thaumatometra comaster* sp. juv? 1 sp.

St. 5 Japan, Kiu Shiu, Kagoshima, 135 fathoms $^{13}/_{5}$. Formol. *Catoptometra Hartlaubi* 1 sp.

St. 6 Japan, Kiu Shiu, Kagoshima and Okinoshima, Scraper I and II, $^{13-14}/_{5}$ and $^{18}/_{5}$ (In the same pot). Formol-spirit (60 or 110—220 fathoms). *Cyllometra pulchella* 7 sp. *Psathyrometra Wireni* 1 sp.

St. 7 Japan, Kiu Shiu, Goto Islands, 23 Miles N. W. (128° 11′ East; 32° 17′ N). 110 Fath. Oseaki, Trawl III $^{14}/_{5}$. Formol. *Metacrinus nobilis var. tenuis* 2 sp.

St. 7 a Japan, Kiu Shiu, Goto Islands, Trawl. IV, 110 fathoms, $^{14}/_{5}$. Formol. *Perissometra aranea* 1 sp.

St. 8 Japan, Kiu Shiu, Goto Islands, Trawl II, Bottom-temp. 13,7° C, 115 Fathoms $^{14}/_{5}$. Formol-spirit. *Comissia parvula* 1 sp.

St. 9 Japan, Kiu Shiu, Goto Islands, 90—115 fathoms, $^{14-15}/_{5}$. Formol. *Metacrinus nobilis var. tenuis* 5 sp., *Metacrinus interruptus* 1 sp., *Metacrinus interruptus form ornatus* 1 sp.

St. 10 Japan, Kiu Shiu, Goto Islands, about 100 fathoms. May. *Metacrinus rotundus* 1 sp.

St. 11 Japan, Kiu Shiu, Goto Islands. Scraper, Pallas rock, 5 Miles E. to S. 90 fathoms. $^{15}/_{5}$. Formol spirit. *Erythrometra rubra* 3 sp.

St. 12 Japan, Kiu Shiu, Goto Islands, the coral bank. 90 Fathoms $^{15}/_{5}$. Formol-spirit. *Cyllometra disciformis* 1 sp., *Cyllometra pulchella* 1 sp., *Asterometra macropoda* 2 sp., *Neometra multicolor* 2 sp.

St. 13 Japan, Kiu Shiu, Goto Islands. 128° 50′ E, 33° 41′ N. Trawl II, 75 fathoms. Sand. Bottom-temp. 15,9° C., $^{17}/_{5}$. Formol or Formol-spirit. *Cyllometra pulchella* 33 sp.

St. 14 Japan, Kiu Shiu, Goto Islands, 128° 50′ E, 33° 41′ N. Trawl III, 75 fathoms. Sand. $^{17}/_{5}$. Formol. *Comanthus pinguis* 2 sp.

St. 15 Japan, Kiu Shiu, Goto Islands. The same locality, Trawl IV. $^{17}/_{6}$. Formol. *Comanthus pinguis* 1 sp.

St. 16 Japan, Kiu Shiu, Goto Islands, The same locality. Trawl VII, $^{17}/_{5}$. Formol. *Cyllometra pulchella* 2 sp.

St. 17 Japan, Kiu Shiu, Goto Islands, The same locality. Trawl I, $^{17}/_{5}$. Formol-spirit. *Cyllometra pulchella* 3 sp.

St. 18 Japan, Kiu Shiu, Okinoshima, Scraper I and II, 50—60 fathoms, Bottom-temp. 16,6° C., $^{18}/_{5}$. Formol-spirit. cf. *Comanthus pinguis* sp. juv. 1 sp.

St. 19 Japan, Kiu Shiu, Okinoshima, Scraper V, 26 fathoms. Bottom temp. 17° C., $^{18}/_{5}$. *Cyllometra manca* 1 sp.

St. 20 Japan, Sagami, Misaki, 2 Metres, $^{19}/_{5}$. Formol. *Comanthus solaster* 1 sp.

St. 21 Japan, Sagami, Misaki, on the shore at low tide, $^{28}/_{5}$. 70 % spirit. *Compsometra serrata* sp. juv. 1 sp.

St. 22 Japan, Sagami, Misaki, 0—2 Metres, $^{28}/_{5}$, 96 % alcohol. *Compsometra serrata* 3 sp.

St. 23 Japan, Sagami, Misaki, Corallina, $^{5}/_{6}$, spirit. - *Compsometra serrata* 1 sp.

St. 24 Japan, Sagami, Misaki, straight off the shore, 140 fathoms, $^{6}/_{6}$, 70 % Alc. *Metacrinus rotundus* 1 sp.

St. 25 Japan, Sagami, Misaki, on the shore at low tide, $^{13}/_{6}$, 70 % Alc. *Compsometra serrata* 3 sp.

St. 26 Japan, Sagami, Misaki, on the shore at low tide (Corallina) $^{14}/_{6}$, spirit. *Compsometra serrata* 2 sp.

St. 27 Japan, Sagami, Misaki, Diver, 3—5 Metres, $^{14}/_{6}$. *Tropiometra afra var. macrodiscus* 8 sp.

St. 28 Japan, Sagami, Misaki, Rocky bottom, 2—3 M. $^{14}/_{6}$, formol-spirit. *Comanthus solaster* 1 sp.

St. 29 Japan, Sagami, Misaki, mud, 200 Metres, $^{23}/_{6}$. *Metacrinus rotundus* 1 sp.

St. 30 Japan, Sagami, Misaki, straight outside the shore, sandy bottom, 200 M. $^{23}/_{6}$. *Metacrinus rotundus* 1 sp.

St. 31 Japan, Sagami, Misaki, straight outside the shore, 100 fathoms $^{23}/_{6}$. Alcohol. *Metacrinus rotundus* 2 sp.

St. 32 Japan, Sagami, Misaki, Okinose, 100 fathoms, $^{26}/_{6}$. Alcohol. *Iridometra melpomene* 1 sp., *Metacrinus rotundus* 1 sp.

St. 33 Japan, Sagami, Misaki, Okinose, 100—200 fathoms, $^{26}/_{6}$.. Alcohol. *Cyllometra disciformis?* sp. juv. 1 sp.

St. 34 Japan, Sagami, Misaki, Okinose, 400 fathoms, $^{26}/_{6}$. Alcohol. *Pectinometra flavopurpurea* 5 sp.

St. 35 Japan, Sagami, Misaki, Okinose, 400 fathoms $^{28}/_{6}$. Alcohol. *Comissia gracilipes* 2 sp., *Cyllometra disciformis* 1 sp., *Pectinometra flavopurpurea* 1 sp., *Dorometra briseis* 1 sp.

St. 36 Japan, Sagami, Misaki, straight off the shore, 200 fathoms $^{1}/_{7}$. Alcohol. *Comissia parvula* 1 sp., *Pectinometra flavopurpurea* 1 sp., *Crossometra septentrionalis* 1 sp.

St. 37 Japan, Sagami, Misaki, Okinose, 400 fathoms $^{8}/_{7}$. Alcohol. *Comissia parvula* 1 sp., *?Comatulides decameros* sp. juv. 1 sp., *Iridometra melpomene* 1 sp., *Dorometra briseis* 2 sp., *Thaumatometra comaster* 1 sp.

St. 38 Japan, Sagami, Misaki, rocky bottom, 2—4 Metres, $^{9}/_{7}$. Alcohol. *Comanthus solaster* 1 sp.

St. 38 A. Japan, Sagami, Misaki, rocky crevices, 3—5 Metres. *Comanthus solaster* 1 sp.

St. 39 Japan, Sagami, Misaki, *Liparometra grandis* 1 sp.

St. 40 Japan, Bonin Islands (Ogasawara), Taki Ura, Diver, coral-bottom. $^{28}/_{7}$. Alcohol. *Comanthus parvicirra* 2 sp.

St. 41 Bonin Islands, Taki Ura, Diver, coral-bottom, $^{28}/_{7}$. Alcohol. *Dorometra nana* 3 sp.

St. 42 Bonin Islands, West from Port Lloyd, 65 fathoms, $^{31}/_{7}$. Alcohol. *Comissia ignota minuta* 1 sp.

St. 42 A. Bonin Islands, West from Port Lloyd, 70 fathoms, $^{31}/_{7}$. Alcohol. *Comanthus annulata* 1 sp.

St. 43 Bonin Islands, NW from Ototojima, 80 fathoms, $^{31}/_{7}$. Alcohol. *Comatella stelligera* 1 sp., *Clarkometra elegans* 15 sp.

St. 44 Bonin Islands, NW from Ototojima, 70 fathoms, $^{31}/_{7}$. Young *Comasterid* 1 sp., *Compsometra parviflora* 1 sp.

St. 45 Bonin Islands, East from Chichijima, 80 fathoms, $^{31}/_{7}$. Alcohol. *Comissia ignota minuta* 9 sp., *Comaster delicata grandis* 3 sp., *Comaster serrata* 1 sp., Young *Comasterids* 15 sp., *Eudiocrinus gracilis pulchellus* 5 sp., *Pterometra trichopoda* 1 sp., *Asterometra anthus* sp. juv. 5 sp., *Compsometra parviflora* 2 sp., *Metacrinus interruptus* 10 sp.

St. 45 A. Bonin Islands, East from Chichijima, 90 fathoms $^{31}/_{7}$. Alcohol. *Comissia ignota minuta* 1 sp., *Tropiometra encrinus* 1 sp.

St. 46 Bonin Islands, East from the Channel, 70 fathoms, $^{1}/_{8}$. Alcohol. *Eudiocrinus gracilis pulchellus* 2 sp., *Catoptometra magnifica minor* sp. juv. 1 sp., *Asterometra anthus* 2 sp., *Compsometra parviflora* 1 sp.

St. 47 Bonin Islands, East from Channel, 80 fathoms, $^{1}/_{8}$ (August). Alcohol. *Comissia ignota minuta* 5 sp., Young *Comasterids* 6 sp, *Eudiocrinus gracilis pulchellus* 2 sp., *Eudiocrinus Loveni* 1 sp., *Catoptometra magnifica minor* spp. juv. 3 sp., *Liparometra grandis* sp. juv. 1 sp., *Asterometra anthus* spp. juv 5 sp., *Compsometra parviflora* 2 sp., *Dorometra parvicirra* 1 sp.

St. 48 Bonin Islands, East from Chichijima, 100 Metres, $^{1}/_{8}$. Formol. *Eudiocrinus gracilis pulchellus* 1 sp., *Pterometra trichopoda* 1 sp.

St. 49 Bonin Islands, the Channel, 35 fath. $^{2}/_{8}$. Alcohol and formol. *Comanthus parvicirra a comasteripinna*, broken arms, *Cenometra bella* 1 sp.

St. 50 Bonin Islands, Chio-ta-jima, on the shore at low tide, $^{3}/_{8}$. Alcohol. Young *Comasterid* 1 sp.

St. 51 Bonin Islands, the Channel, 40 fath. $^{3}/_{8}$. Alcohol. *Comaster delicata grandis* 1 sp.

St. 51 A. Bonin Islands, the Channel, 35 fath. $^{3}/_{8}$ Formol. *Comantheria grandicalyx var. flagellipinna* 1 sp.

St. 52 Bonin Islands, Taki-no-ura Channel, 30—40 fath. $^{3-4}/_{8}$. Alcohol. *Comantheria grandicalyx* 2 sp.

St. 53 Bonin Islands, Higashijima (2 Miles East), sand + broken shells, 90 fath., $^{7}/_{8}$. Alcohol. *Comatella brachycirra* 5 sp., *Comatella maculata* 1 sp., Young *Comasterid* 1 sp.,

Eudiocrinus gracilis pulchellus sp. juv. 1 sp., *Cyllometra albopurpurea* spp. juv. 2 sp., *Asterometra anthus* (some young ones) 11 sp., *Dorometra parvicirra* 1 sp., *Clarkometra elegans* 2 sp.

St. 54 Bonin Islands, East from Chichijima, 70 fath., 7/8, broken shells + sand. Young *Comasterid* 1 sp., *Asterometra anthus* spp juv. 2 sp, *Compsometra parviflora* 1 sp.

St. 55 Bonin Islands, ENE. from Chichijima, 115 fath., shells + sand, 15/8. Alcohol. *Comatella brachycirra* 2 sp., *Comissia ignota minuta* 11 sp., *Comaster serrata* 1 sp., *Asterometra anthus* sp. juv. 1 sp., *Stenometra dentata* sp. juv. 1 sp.

St. 56 Bonin Islands, East from the Channel, 115 fath. 15/8. Alcohol. *Comatella brachycirra* 2 sp., *Comatella stelligera* 1 sp., *Asterometra anthus* 7 sp., *Stenometra dentata* 5 sp., *Diodontometra Bocki* 1 sp., *Metacrinus nobilis tenuis* 1 sp., *Metacrinus interruptus* 4 sp.

St. 57 Bonin Islands, East from Chichijima, 100 fath., 15/8. *Asterometra anthus* sp. juv 1 sp.

St. 58 Bonin Islands, the islands East from Chichijima, 180 Metres, 15/8. *Metacrinus nobilis tenuis* 1 sp., *Metacrinus interruptus* 2 sp.

St. 59 Bonin Islands, ENE from Anojima, 100 fath. 15/8, formol or alcohol. *Comatella brachycirra* 7 sp., *Comatella maculata* 2 sp., *Comatella stelligera* 2 sp., *Comissia peregrina magnifica* 2 sp, *Comaster delicata grandis* sp. ad. 1 sp., *Comaster serrata* 1 sp, *Catoptometra magnifica minor* 3 sp., *Eudiocrinus indivisus* 1 sp., *Cyllometra albopurpurea* 2 sp., *Pterometra trichopoda* 3 sp., *Asterometra anthus* 20 sp., *Stenometra dentata* 3 sp., *Metacrinus interruptus* 4 sp.

St. 60 Bonin Islands, ENE from the Channel, 100 fathoms, 15/8. Formol. *Comaster delicata grandis* 1 sp.

St. 61 Bonin Islands, ESE from the Channel, 83 fath., 16/8. Formol. *Comissia ignota minuta* 2 sp., Young *Comasterid* 1 sp., *Catoptometra magnifica minor* sp. juv 1 sp.

St. 62 Bonin Islands, the Channel between Chichijima and Anojima, 20 Metres, August. *Comantheria grandicalyx var. flagellipinna.* 1 sp.

St. 63 Japan, Sagami, Misaki, on the shore at low tide, 14/9. Alcohol. *Comanthus parvicirra a comasteripinna* sp. juv. 1 sp.

Misprints.

p. 66,	3d	line	from	below	for	able-formed	read table-formed.
p. 75,	16th	»	»	»	»	inside, 1/2	» inside, 1 1/2.
p. 99,	6th	»	»	»	»	75	» 45.
p. 123,	1st	»	»	above	»	bifucation	» bifurcation.
p. 159,	7th	»	»	below	»	54 (XIV)56 mm.	» 51 (XIV) 56 mm.

Photos: Plate I.

1) *Comatella brachycirra* (St. 56 Sp. 1 and 2; 1 in lateral view) about × 2.
2) *Comissia peregrina magnifica* (St. 59 Sp. 1 and 2) nat. size.
3) *Comissia ignota minuta* (St. 47) $^{2}/_{1}$.
4) *Comaster delicata grandis* (St. 45 Sp. 3) nat. size.
5) *Eudiocrinus gracilis pulchellus* (St. 45) $^{2}/_{1}$.
6) *Eudiocrinus Loveni* (St. 47 Sp. 1) $^{2}/_{1}$.
7) *Stenometra dentata* (St. 56) $^{2}/_{1}$.
8) *Clarkometra elegans* (St. 43 Sp. 1) $^{2}/_{1}$.
9) *Cyllometra pulchella* (St. 13) $^{2}/_{1}$.

Plate II.

10) *Diodontometra Bocki* (St. 56 Sp. 1) $^{2}/_{1}$.
11) *Toxometra æquipinna* (St. 4, Sp. 1) P_3 visible to the left, $^{2}/_{1}$.
12) *Psathyrometra Wireni* (St. 6, Sp. 1) $^{2}/_{1}$.
13) *Metacrinus interruptus* (St. 56 Sp. 16) the newly formed arms of somewhat unequal size; about × $1^{3}/_{4}$.
14) *Metacrinus interruptus* (Sp. 16) the same specimen viewed from another side, $^{2}/_{1}$.
15) *Metacrinus interruptus* (St. 56 Sp. 13) the ne warms of very different length, $^{2}/_{1}$.
16) *Asterometra anthus* (St. 55 Sp. 53) a very young specimen, $^{4}/_{1}$.

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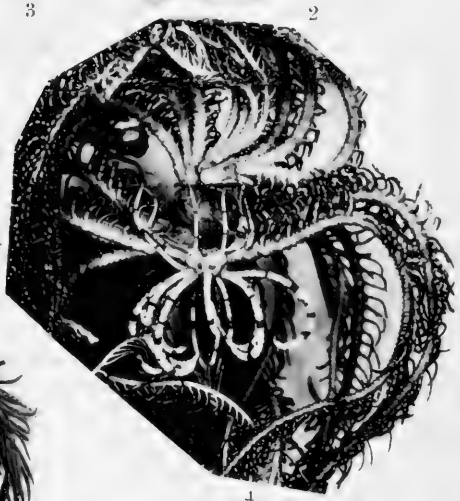

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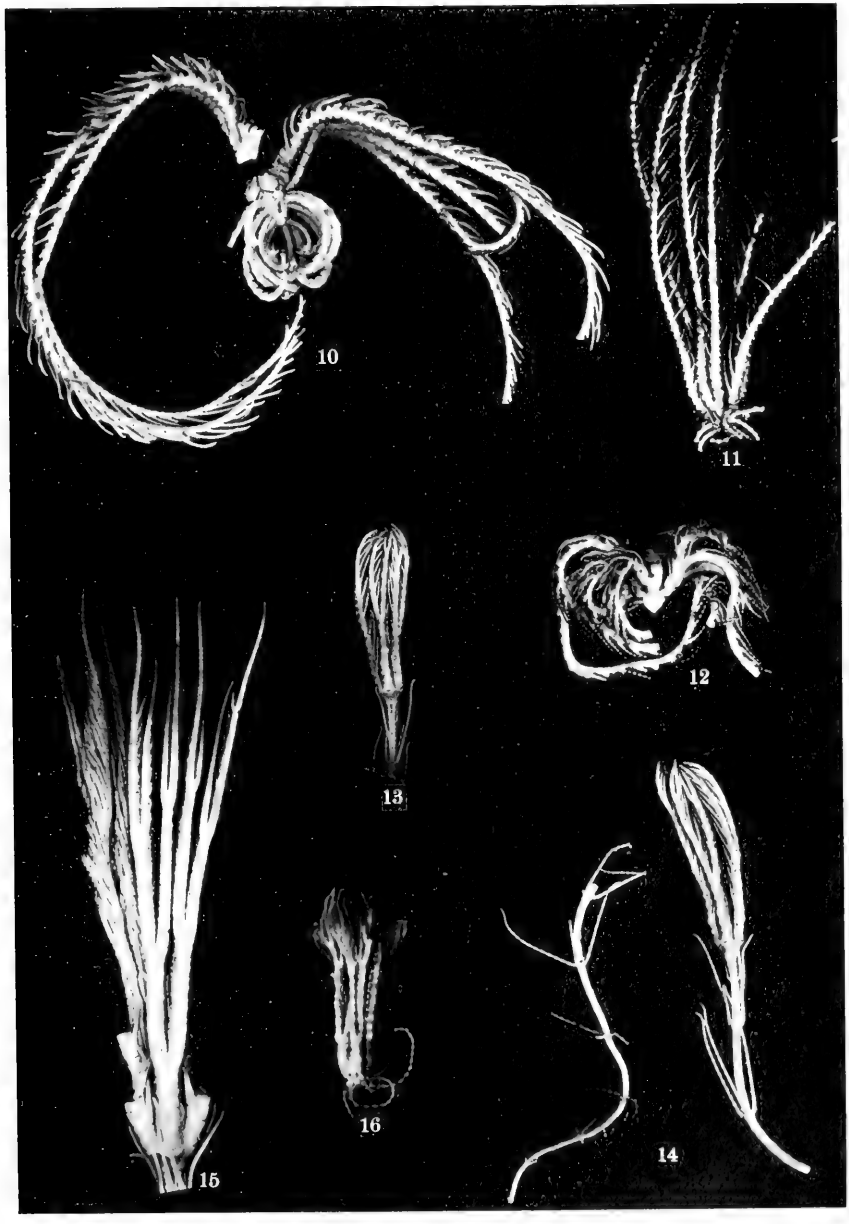
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A–B